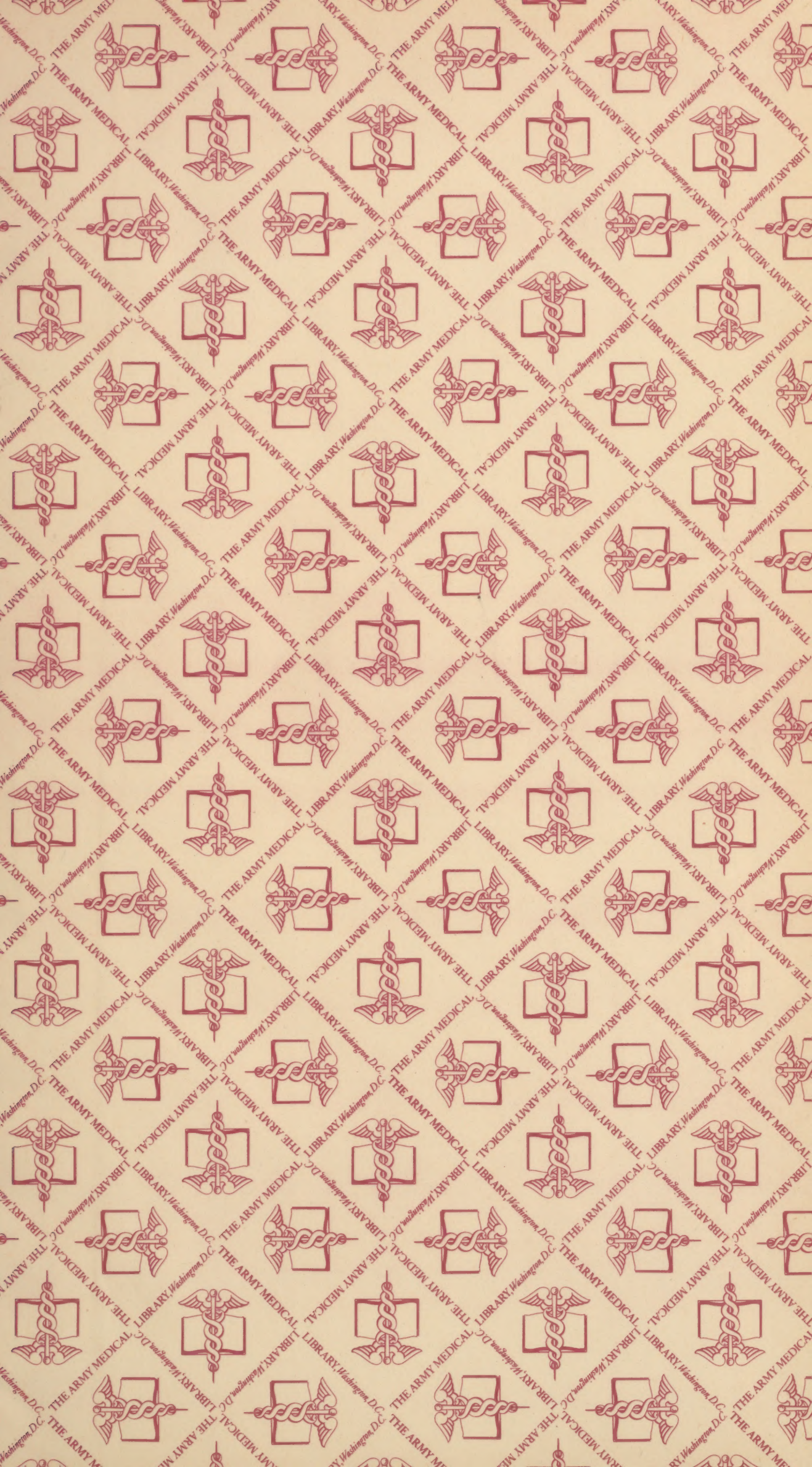
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IX.

HEPATITIS CONTAGIOSA
(EPIDEMICA)

Translation prepared by:

Office of Military Government for Germany (U. S.)
Office of Naval Advisor
Medical Section

Germany (Territory under Allied Occupation, 1945–
U.S. Zone)

1. Clinical considerations.

Oberfeldarzt (Lt. Col., MC.) Prof. GUTZEIT

The name "hepatitis epidemica", chosen for this disease by LINDSTEDT, cannot be considered a fortunate choice since the epidemic spread of the disease can hardly be called more than an episode in the clinical history. Since that name for the disease does not cover the sporadically occurring cases, my suggestion is to have it called more correctly "hepatitis contagiosa (epidemica)". This term includes both its constant characteristics in a distinct form, i.e. involvement of the liver and its contagiousness.

The high incidence of jaundice in the fall of 1941 was preceded by scattered single cases in the fall of 1940 and 1939. In autumn of the present year (1942) a severe epidemic has spread particularly among the Armed Forces fighting in the East. Evidence has shown regularly that the high point in the frequency of this disease is in October and November, and that the gradual simultaneous increase begins early in July and has been observed regularly over quite different and widespread areas. In the course of last autumn our home territory was affected by this disease in a similar manner and is even more apparent during the present year. The frequency of hepatitis contagiosa comes close to that of Volhynia fever and its rate is higher than that of the commonly known infectious diseases.

Besides its appearance as an epidemic infection the disease also occurs sporadically without any evidence of existing chains of infection. If any other pathogenic process or etiology were thought to be the cause of such sporadic cases one would expect a difference of the curves of incidence between sporadic and epidemic infections. Yet investigations made by three candidates for a doctor's degree during the period 1 July 1939 and 30 June 1940 and furthermore from 1 October 1940 until 31 December 1940, based upon the clinical records of the "Archiv fuer Wehrmedizin" (Archives of Military Medicine) showed, that the rates of incidence in both the sporadic and epidemic forms of the disease are entirely parallel, thus proving that in the overwhelming majority the sporadic cases are hepatitis contagiosa. Single cases of the disease that are due to another kind of parenchymal involvement of the liver are numerically trifling and not worthy of special consideration.

The infectious character of hepatitis contagiosa is indicated by the slow gradual seasonal increase in incidence, then its climax and gradual decline again, furthermore by its increased frequency in war time, and also in peace time in connection with unhygienic conditions - in camps or barracks -, and its side-by-side occurrence in both sporadic and in epidemic forms. Further typical evidence of its epidemic character is seen in the fact that sporadic cases exceed in numbers the epidemic infections when the epidemic is on the decline, as was observed in some places from January 1940 onwards. Apart from this the disease in its clinical picture - and this refers in particular to the initial stage -

is unmistakably analogous with true infectious diseases, such as e.g. poliomyelitis, scarlatina etc. It is true on the other hand that in only 50 per cent of the cases is a febrile initial stage observed, succeeded by an intermediate period of few symptoms, which then is followed abruptly by the appearance of jaundice, whereupon all subjective symptoms frequently vanish quickly. For this reason the afebrile cases of the disease, associated with preceding gastro-intestinal symptoms have led to the belief that they had nothing to do with hepatitis contagiosa, but more likely were part of the symptoms peculiar to the group of so-called "catarrhal icterus". Yet this certainly cannot be true, for

1. both the febrile cases of the disease as well as those starting with intestinal symptoms occur in the same seasonal period,

2. they both affect juveniles in an equal proportion,

3. under unhygienic conditions both forms increase in frequency,

4. in the case of unmistakable epidemic infections the febrile as well as intestinal initial phases occur side-by-side,

5. in all other respects, clinical aspects and processes both forms are completely parallel with each other.

All attempts so far to establish a clinical difference between the sporadic and the epidemic forms of the disease have definitely proved a failure.

The icterus lasts 25 - 30 days on an average. Swelling of the spleen and liver, erythrocyte and leukocyte level as well as the other clinical subjective symptoms last for the same period. Galactose and Levulose tolerance, bilirubinemia, bilirubinuria, urobilinuria as well as Takata-Ara tests do not show any difference in the course of either form. Lymphomonocytosis is characteristic for both forms. I cannot confirm HOLLER's view, that lymphocytosis is typical for icterus catarrhalis, and on the other hand monocytosis for hepatitis contagiosa. Finally in regard to the sedimentation rate no difference is observed, it can be normal, reduced or considerably accelerated; in the second week of the disease it shows a moderate increase on the average. MEYTHALER observed, while the disease was progressing, bi- or tri-phase variations in the sedimentation rate, and he associates this with the well-known hepatic changes.

Whether or not the so-called "icterus catarrhalis" still exists can be decided only when the virus of hepatitis contagiosa has been detected, and can be proven for each single case. In my opinion cases of "icterus catarrhalis" which do not fit the diagnosis hepatitis contagiosa will be quite few. As regards the jaundice associated with typhoid fever, the paratyphoid group, the enteric diseases due to infection, dysentery, as well as malaria, I think I can say

is due to a mixed infection combined with hepatitis contagiosa. As to the so-called "Salvarsan icterus", which just now is suddenly observed again more frequently, similar causes may be predominant. During and after World War I, just as it is now after the second year of the present war, when hepatitis contagiosa is spreading, Salvarsan complications are also appearing more frequently, - a somewhat strange and interesting - but certainly not accidental coincidental occurrence.

The change into a cirrhosis of the liver or the course of an acute liver dystrophy is seldom observed. We do not yet know enough about later developments and their connection with cirrhosis of the liver.

Relapses occur sometimes, only after a latent period of 2 to 3 months; their duration of 40 days on an average exceeds that of the primary infection which averages 25 days. Residual symptoms persist for a longer period. Reinfections - at the earliest date with the spread of a new epidemic -occur in not more than 1 to 2 per cent of all cases, thus proving that a strong and lasting immunity is firmly established.

The treatment of the average mild case of hepatitis contagiosa can be limited to rest in bed, application of heat and a diet rich in carbohydrate and poor in fat. One need not be too concerned about the protein supply. Glucose and insulin administration as well as duodenal syphonage may be reserved for the few serious cases. In such instances a fruit and vegetarian diet, in particular uncooked food, appears to be advantageous. As to whether or not adrenal cortical preparations, Vitamin B_2 or any of the other vitamins, as well as K and Ca supplies and the restriction of NaCl are useful cannot be said as yet. Research on this subject, which could clarify this matter is missing. In general all these measures surely may be dispensed with. To administer a cholagogue too early is considered as undesirable.

From a military medical point of view and in recapitulation it can be concluded, that on the whole hepatitis contagiosa

a. is a disease worth serious consideration because of the involvement of the parenchyma of the liver,

b. if treated with expert care usually progresses mildly and a favorable prognosis may be expected,

c. does not require medical care that could not be met with in any case by the physician and the medical service.

Most patients will arrive at base hospitals with practically no jaundice after 3 or 4 days enroute, even without the appropriate diet during evacuation, and then they require nothing more than two or three weeks of re-

creation along with a moderate diet. Moving them backwards to the home territory often will cause relapses which require extended medical treatment. Thus all cases of icterus, as a matter of principle, should be treated in the colleting stations of base hospitals until the jaundice disappears, and then only should they be moved on to hospitals for minor or convalescent cases and be left there until fitness for duty is regained. Transport homewards is indicated only if the icterus lasts for 3 weeks. Such transports should be berthed in fully equipped hospital trains. Most of the patients will be fit for service after 3 - 6 weeks. Their remaining in the Army Groups and the rear areas retains this large group available for service in the Army. According to our experiences it takes months in the home territory before the patients regain their fitness for service. To keep the patients isolated, as is prescribed by general directives, is not only quite impossible but also unnecessary, since practically the disease is contagious only in the pre-icteric stage. In the icteric stage itself, however, it is no longer contagious, which is proved by the fact that infections occur in the hospital only rarely. Exceptions, if any, merely confirm the rule. To simplify medical care and to save personnel it will be advisable to have the patients collected on special wards.

I do not wish to touch on the subject of the continuing pathologico-anatomical as well as etiological research, base on liver punctures and inoculations from animal to animal, made by my coworkers Oberarzt (1st Lieut., MC.) Dr. VOEGT and Oberarzt (1st Lieut., MC.) Dr. DOHMEN.

2. Pathology of hepatitis epidemica.

Oberarzt (1st Lieut., MC.) Dozent BENECKE

Reporting on hepatitis epidemica at the present time is still more difficult to the pathologist than it is to the clinician. The main reason may lie in the "case-material" per se, because:

1. generally speaking the prospects for recovering from hepatitis epidemica are favorable and, therefore, it rarely concerns the pathologist,

2. the overwhelming majority of available autopsy material does not permit a positive opinion, since most of the fatal cases in hepatitis epidemica - amounting to about 100 in the Army since the war began - developed from a clinically uneventful beginning into a hepatic coma. In postmortem examination these cases often reveal an acute or subacute liver atrophy, i.e. a histolysis so far advanced that hardly any positive indication as to primary changes in the tissue is possible. In other cases, hepatitis epidemica is found not to be the only reason for the fatal outcome. These cases either show complications

with some other fatal diseases, or hepatitis epidemica developed quite separately in the course of some other fatal disease. Besides we know by experience that the mentioned diseases are infrequently due to infections, and so the question arises, as to whether the changes observed in the liver are due to hepatitis or to the fatal disease,

3. in icteric corpses postmortem decomposition sets in very quickly after death. Therefore it will be very difficult to ascertain whether or not minute change of the tissues are relevant from a histologic point of view, or if these changes are only the consequence of postmortem processes.

The above three points are primarily responsible for the fact that from the pathologist's point of view a conclusive report cannot be given at the present time. On the other hand there are some problems which should be considered In short they are:

1. Is a marked histologic substratum observed in hepatitis epidemica and is it so characteristic as to allow in itself - even if the clinical course is ignored - a clear cut distinction from all other liver complaints regardless of their being associated with icterus or not?

2. Do the minute changes of the tissues correspond to the so-called serous inflammation, as described by EPPINGER and ROESSLE?

3. Is the pathologist in a position to establish whether hepatitis epidemica is an infectious or an exotoxic respectively endotoxic disease? Is he in a position to decide at the same time in which way the "ens malignitatis" invaded the liver?

4. Is HOLLER right in assuming that hepatitis epidemica is a universal reticulo-endotheliosis?

The pathologico-anatomical literature on hepatitis epidemica cannot be dealt with in this place. Moreover, this will be possible in an exhaustive manner only after the war as the result of a critical re-examination of all contributions so far published. All the same, it can be safely said even today that part of the cases of acute or subacute liver atrophy of peacetime must be classified as hepatitis epidemica in its highest degree of intensity. During the present war, reports were made principally by the consultant pathologists, Oberstabsarzt (Major, MC.) Prof. Dr. SIEGMUND, Oberstabsarzt (Major, MC.) Prof. KRAUSE, Oberstabsarzt (Major, MC.) Prof. RANDERATH and Stabsarzt (Captain, MC.) Prof. WERNER SCHMIDT.

My own case material, originating from autopsies in the Balkans, consisted of three cases of hepatitis epidemica which had developed into acute liver atrophy and consequently need not be considered here. In the other available autopsy

material hepatitis epidemica did not cause the death either, but developed in the course of other diseases, such as post-diphtheritic paralysis with fatal outcome due to a paralysis of the phrenic nerves, or infection of the thigh stump, streptococcus phlegmons etc. One case seems to be particularly worthwhile mentioning in which three years after a severe jaundice, death was caused by paratyphoid infection.

Macroscopically, the liver shows an enlarged and pasty appearance, the frontal edge is bevelled and the surface smooth. The liver tissue appears through the capsule in a chestnut color with a green tinge or olive colored. The section of the parenchyma shows a cloudy and dilated appearance, and it usually presents a streaky greenish pattern in some places, and a net-like pattern in others. Sometimes the greenish tinged spots form little throughs as compared to the adjacent liver tissue. Nothing irregular is observed in the other bile ducts. The gall bladder reveals an edema of the wall, and in one of our cases which developed into atrophy, a slight catarrhal cholecystis (no flaring up infection) could be observed. The epigastric lymph nodules show an inflammatory swelling (histologically inflammatory sinus catarrh with bile-pigment and fat accumulation). The spleen is usually enlarged, even in case that a non-septic disease caused the death (histological reticular cell reaction, moderate multiplication of leukocytes and toxic follicular degeneration). Heart and kidneys show serious parenchymal damage, especially when death is due to an infectious disease. Hemorrhagic diatheses in a more advanced form is a complicating factor. Associated with hepatitis it may be expected to develop into liver dystrophy or tending to hemorrhage, because of a septic basic disease.

Microscopically, the liver shows remarkable changes (numerous histological preparations are at hand) both in the parenchyma and in the stroma of the vessels. These changes are concentrated in the lobe center and diminish in intensity towards the periphery. Concomitantly an activation of the endothelium and frequently a massive bile and pigment accumulation in the stallate cells is observed. The portal vein capillaries may as a consequence of a damage to the walls contain many erythrocytes in the lobe center, whereas their wide lumina contains only homogenous protein masses. In fresh cases a multiplication of granulocytes in the capillaries is observed. Relatively early an infiltration with granulation tissue cells becomes apparent in Glisson's connective tissue, the histiocytes show abundant fat and bile deposits. When the disease progresses these changes subside and the formation of connective tissue is observed which takes rise in the lobe center as well as in the Glisson wedge. The final phase of the disease exhibits a cirrhosis-like picture varying in severity. For completeness' sake it should be stated further, that in those cases which develop into atrophy the necrosis will not always be most pronounced in the lobe center, but it may as well exhibit an irregularly scattered spotty character, sometims even preferring the outer areas of the lobe. Changes in the transverse striated muscules, as observed by SIEGMUND, were also found in our material. Such cases of micronecrosis are particularly

interesting. As a rule, one fibre or minute complexes of fibres only are involved which in later phases cause the formation of granulation tissue. In no case, however, do such changes go so far as to deteriorate muscular tissue, as is a characteristic feature of Weil's disease. In reply to the various questions raised it can be said:

1. Hepatitis epidemica, as a matter of fact, shows a fairly characteristic tissue picture. However, the speaker is in doubt whether or not this picture is a specific one, because he encountered cases of amebic hepatitis, severe malaria hepatopathy and Salvarsan damage of the liver (latter case clinically not associated with icterus) in which considering only the histological aspect, a differentiation from hepatitis epidemia was quite impossible. Quite the same sometimes applies to so-called septic icterus. Therefore the question must be raised - with a certain reservation for the present - whether or not changes observed in hepatitis epidemica are specific or inherent organic reactions of the tissue itself, due to various factors. A differentiation from icterus due to stasis, from icterus hemolyticus and from Weil's disease and yellow fever should in any case be possible.

2. Proof is missing so far, in the speaker's opinion, that the microscopic hepatic changes under review correspond to so-called serous hepatitis. Furthermore it must be mentioned that the findings refer to autopsy material which in most cases was not available immediately postmortem.

3. A universal reticulo-endotheliosis, in the sense of HOLLER, does not seem to prevail in hepatitis epidemica, although a reaction of the reticulo-endothelial system of the epigastrium - liver, spleen, epigastric lymph nodes - is observed there is no universal reaction of the lymph nodes and of the reticulum of the bone marrow. If swellings of lymph nodes occur outside the epigastrium they may be due to some other cause, as for instance swelling of lymph nodes of the neck in our material was found to be due to preceding diphtheria or to staphylodermatitis.

Recapitulating it can be said, that from the pathologico-anatomical point of view two factors will contribute materially to clarify the hepatitis problem. One factor is a systematic examination of a great many cases of hepatitis epidemica immediately after death, especially in case of incidental deaths (mine or bomb explosions, traffic accidents etc.) and excluding cases with complications. The other factor of decisive importance is a close cooperation with the clinician, with the view of comparing the pathologic postmortem findings with the tissue obtained by liver puncture from the respective patients (ROHOLM and IVERSEN, VOEGT). For the pathologist too the solution of the hepatitis problem will depend on the detection of the suspected but not yet proven causative agent of the disease.

Discussion:

SIEGMUND: Refers to his detailed monograph on hepatitis epidemica.

BUECHNER: In general specimen of liver tissue from living patients as shown to me by NONNENBRUCH, confirm the picture as reported by BENECKE. After a few months, the changes subside completely (see AXENFELD and BRASS in Frankfurter Zeitschrift fuer Pathologie, Volume 57, No 2, 147, 1942).

KAEMMERER: BORST could not observe the typical picture of hepatitis serosa in three autopsies but in all of them he found distinct interstitial inflammations. One of these cases was a clear cut traumatic death (crash) and just this case (completely recovered from acute icterus) exhibited the most severe interstitial inflammations and splenic fibrosis; only a few small lobes of the liver showed a fatty degeneration and decay of cells of the liver. BORST raised the question whether this interstitial inflammation is a sequel to the primary disintegration of liver cells, or is an independent and only co-ordinated phenomenon, or if this interstitial inflammation in the further course of the disease develops into cirrhosis of the liver. It is suggested that special attention be paid to the distinct slowly subsiding form, which often is seen here, especially when the icterus lasts very long. The persistence of liver or spleen swellings as well as the aldehyde reaction and a strong Takata reaction, although varying qualitatively, should be given special attention. As to hepatitis contagiosa in the Army the new quantitatively apparently more effective Takata modification by GROSS may suit the purpose better.

HOLLER: If icterus is the decisive diagnostic symptom it may be extremely difficult, if not at all impossible in the present circumstances to distinguish between sporadic and epidemic hepatitis. Cases of hepatitis epidemica without icterus are more frequent than cases with icterus. If one patient out of a number of cases without icterus develops icterus, this case, as it occurs sporadically, will be classed as icterus catarrhalis. Monocytosis is an ever present symptom in hepatitis epidemica, just as is the swelling of the spleen or liver. In younger patients, now and then, a general swelling of the lymph nodes is observed. For this reason, in pathogenesis and clinical treatment of hepatitis epidemica, I have tried to put the monocytic reaction into the center of my considerations. If BENECKE is of the opinion that a universal reticulo-endotheliosis is improbable and furnishes proof of its presence in the abdomen only (liver, spleen, portal lymph glands), I agree with him on the whole. This also applies to cases associated with monolymphocytic reaction, as e.g. PFEIFFER's glandular fever, and even more to monocytic angina characterized by changes of the pharyngeal tonsils which are, in accord with the above, local rather than general symptoms. I suggest that the concept of alimentary toxic disorder of the liver (icterus catarrhalis) under no circumstances be denied.

Nowadays, it occurs very frequently along with hepatitis epidemica. Coincidence of both diseases in my opinion produces the picture of hepatitis epidemica associated with icterus. GUTZEIT has pointed out, that in epidemics of hepatitis contagiosa, Salvarsan icterus is more frequently observed. I fully agree with him, as this proves that, owing to a developing intercurrent new liver complaint, hepatitis epidemica without icterus develops into hepatitis epidemica with icterus. There are still other similar instances of developing infections and alimentary intoxications etc. The sedimentation rate in hepatitis epidemica shows an acceleration even in an early phase. Finally, to underline my opinion that hepatitis epidemica is caused by a causative agent with a specific affinity to the reticuloendothelium, I wish to add that DAVID - Vienna - succeeded in cultivating a little rod in a marrow biopsy of a patient suffering from jaundice. The properties of this rod show some resemblance to the bacterium monocytogenes (NYFELD). The latter produces monocytosis and liver parenchymal involvement in animals.

UHLENBRUCK: The speaker was asked to furnish information concerning the incubation period for hepatitis epidemica. In one instance an incubation period of 4 weeks was observed (man on furlough, his child, doctor, nurse). In other cases the epidemic spread rapidly progressing with short intervals of incubation has been observed. In sporadic cases, however, no indication as to the time of incubation can be given. Furthermore, the following observations have been made: In Africa, hepatitis epidemica appears, due to the change of climate, especially in new-comers, in cases of inappropriate diet, poor quality fat, cold drinks and infections (angina, diphtheria etc.). One has the impression, that the virus is present everywhere and any involvement of the intestines or a decrease of the resistance of the organism may result in a manifestation of hepatitis.

KALK: The question of suitability for military assignment following the recovery from hepatitis epidemica is important. Much the same as in icterus catarrhalis, which after all I do not consider identical with hepatitis epidemica, liver troubles are observed for some time, which generally last longer and appear in a more serious form than in the case of icterus catarrhalis. It struck me, that just the galactose test, which ordinarily does not give a particularly exact test of the liver functions becomes positive for a prolonged period at a moment where the graduated Takata and the urobilinogen tests often become negative. Therefore after a severe hepatitis epidemica has been overcome, it will be necessary to make a liver function test, before reassigning the man for duty. This particularly applies to soldiers liable for a new assignment in Africa where the liver affecting agents appear to be present in a particularly high degree.

BERG: Acute painful conditions in the epigastrium with meteorism are observed when the initial fever subsides, also in non-manifest icteric forms of hepatitis contagiosa (definable only by determination of bilirubin in the serum).

These pains are considered to be due to a swelling of the lymph glands and may last for days. In the case of a soldier on furlough an incubation period of 38 days could be observed. Abnormalities in the remaining N or residual N determination, associated with Weil's disease as described by DOHMEN of my clinic, were not observed so far; it is however presumed that existing tuberculosis may be badly influenced by an additionally developing hepatitis.

DENNIG: In hospitals, infections of hepatitis epidemic are rarely observed. 45 hospitals reported only 10 cases of infection and these cases who had been hospitalized for more than 4 weeks because of other diseases together with patients suffering from icterus.

GUTZEIT: (Summary) Many cases of hepatitis proceed without icterus. An accurate diagnosis is only possible if the diseases occur in groups, because in Russia monolymphocytosis and enlargement of spleen and liver often occur without hepatitis. Icterus is no complication, but a symptom of hepatitis, just as is the case with the exanthem in scarlet fever in spite of many cases progressing without exanthem. Icterus develops also without additional injurious agents (alimentary or infectious forms). Acceleration of the sedimentation rate in icterus catarrhalis was also often observed over the last ten years in patients of my clinic. Neither an inappropriate diet, nor typhoid-paratyphoid diseases will necessarily cause hepatitis contagiosa. The period of incubation is 4 weeks (2 to 6 weeks). The sudden appearance of several cases within a group of persons indicates a common source of infection (contaminated water or meals). Galactose intolerance and positive Takata-Ara test will be observed even in mild cases. The course of the disease is not uniform. Considering the great number of mild cases in the Field Army, it is practically impossible to make fitness for duty dependent on liver function tests. In more serious cases residual symptoms should be carefully watched, such as: enlargement of liver and spleen, aldehyde secretion, Takata-Ara test, K.H. tolerance.

Liver puncture biopsies were made at my suggestion by Oberarzt (1st Lieut., MC.) Dr. VOEGT in my Breslau clinic, as well as for one year in Greece on many patients. The results which are known to BENECKE, have not yet been published. There was no serous hepatitis. An early symptom is the increased growth of the capillary endothelium and enlarged Kupffer's stellate cells, which are finally cast off into the capillary vessels which are partly thereby obstructed and filled with protein enriched fluid. Moreover, there was often observed a large scale dissociation of trabecula liver cells with changes of size and nuclear conditions (vacuolar degeneration). The rehabilitation of these changes as observed in several liver biopsies on the same patient was really astonishing. Periportal heterogenous accumulation of round-cells is observed.

Directives:

1. Hepatitis contagiosa is an infectious disease. So far neither the causative agent nor the route of infection are known. The route of infection is probably

not unique. Beside a transfer by droplets or smear, infection may also be caused by foodstuffs and water, or by an inanimate carrier. This explains the incidence of the disease both in series and in groups.

2. An increase of the disease is seen in August, reaching its peak in October/November and subsidence from January to March.

3. In most cases, the infection is contracted in the pre-icteric phase when a diagnosis is rarely established and thus it would anyway be too late for isolation. All the same, in order to simplify the medical treatment, and in consideration of the high incidence it will still be advisable to keep the patients in separate wards, rooms, etc.

4. In addition to the typical icteric form there exists a form without icterus, which is characterized by the enlargement of the liver and spleen, the occasional rise of temperature, the increase of bilirubin in the serum, a positive urobilinogen test of the urine and often by a monocytosis in the blood picture.

5. In the greater part of the cases the disease progresses uneventfully, the more so if the patient is confined to bed early and put on a diet (rich in carbohydrate and poor in fat and protein). Prolonged stay en route is harmful and causes much delay in the final recovery. Hospitalization should - if possible - be within the area of the same Army group - should last until the jaundice is gone (8 to 10 to 20 days). Then, relaxation and admission to a convalescent hospital is advisable until the patient is fit for duty again.

6. The suitability for service after recovery depends largely on the subsidence of the enlarged liver and spleen, on a negative aldehyde reaction of the urine with a normal diet and under physical strain, regain of lost weight, and with a reduction of the sedimentation rate.

7. In single cases, especially if the patients are elderly, the recovery is slow and careful treatment is necessary. During this period of recovery frequent aldehyde tests of the urine, Takata reactions and determinations of the bilirubin in the serum are necessary. If the icterus lasts for 3 to 4 weeks early recovery cannot be expected. In that case evacuation to a hospital at home by hospital train, in bed and a special diet will be necessary.

8. If there are a great number of jaundice and other minor cases at the same time (in autumn), it will be advisable to establish special convalescent hospitals within the area of the armies for the hospitalization of less severe cases to keep the patients near to the armies.

9. Glucose, insulin, duodenal syphonages should be reserved for serious cases.

10. The pathologico-anatomical examination reveals the presence of changes of the liver stroma and of the parenchyma which are generally more accentuated in the center of the lobules than in the periphery. Necrosis of the liver cells and thrombosis of the bile are also observed. At the same time we observe an increased growth of the endothelium and an early infiltration of the interlobar connective tissue of a resorptive character. The process of healing often proceeds with a very slight tendency to scar-formation. The pathologico-histological changes are not specific for the disease. The pathologico-anatomical picture shows swelling of the lymph glands in the epigastrium enlargement of the spleen and from a histological aspect micronecrosis in the transversely striated muscular system. Inflammatory changes of the kidneys and of the cardiac muscle do not pertain to the pathologico-anatomical picture. The extra-hepatic bile ducts remain unchanged. The gall bladder shows edema of the walls.

11. In times of an epidemic spread of hepatitis contagiosa potent remedies, such as Salvarsan, mercurial preparations etc. should be used only after having made a careful physical examination and if necessary a liver function test in order to avoid toxic effects.

12. Hepatitis contatiosa is a disease which must be reported as a communicable disease. If jaundice occurs frequently the case must be supposed to be hepatitis contagiosa unless other clear cut reasons are diagnosed, such as stone obliteration, hemolytical icterus etc.

Relapses and sequelae may occur. Relapses usually show a more serious course.

X.

W A R N E P H R I T I S

Translation prepared by:

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Medical Section

1. War Nephritis.

Marine Oberstabsarzt (Lt. Comdr., MC., Navy)
Professor VOLLHARD

First of all it must be emphasized that the so-called "war nephritis" is not a special type of nephritis whose course differs from the peace-time form in any way. Similar to the "trench" nephritis of World War I, it is identical with the diffuse glomerular nephritis known from pre-war ti as described by LANGHANS, LOEHLEIN, and FAHR. Its etiology is not yet clear. An increase of the incidence of the disease was observed for the first time only in the winter campaign in Russia in 1942. The relation between the number of cases in troops at home and in the field may be of interes The so-called absolute figures for nephritis apparently have risen also in the Reserve Army in 1942. In the Field Army a rise could be observed even before that time. However, the relative figures based on the total number of soldiers, reveals that the increase refers exclusively to the Field Army, and only in 1942, with an extraordinary peak in March and April. This high incidence persisted during the summer months too.

The local distribution of the new cases in the various months is very remarkable. I am indebted to by distinguished former co-worker, HILDEBRAND, well known to be an expert of repute for nephritis for the following figures from a hospital unit under his command:

I	II	III	IV	V	VI	VII	VIII	IX	Months
16	22	87	50	131	71	70	39	15	Cases

The sharp rise at the time of snow-melting is indeed very impressive followed by the high incidence in May and the decline in August. A similar monthly survey from the same sector of the front of all new cases of angina and colds caused by infection would be of value. The rise and fall of the curve can hardly be interpreted as the specific manifestation of a particular disease, as related to a specific infectious agent or perhaps a virus. This also applies to the increased frequency of nephritis in certain communities. The same increase is also observed in case of angina. Any comparison with the unrestrained epidemic spread of icterus* is absolutely out of place.

*) NETZLAFF reports that he found hemolytic streptococci in throat smears of patients suffering from nephritis without upper respiratory disease at a time when a remarkable prevalence of nephritis was observed.

Most patients believed the wet weather was responsible for the outbreak of the disease. The patients had arrived in great numbers from swampy regions, where even in summer-time the land did not become dry. No doubt, wetness followed by a cold, or even a cold alone without preceding wetness can be the cause of acute diffuse glomerular nephritis, as stated and illustrated by various examples in publications of World War I.

It is also firmly established that an upper respiratory infection can often be an additional factor. It is a question which probably has to be answered in the affirmative whether or not the diffuse nephritis can be contracted solely through exposure to wetness and chilling without any infection or fever being associated with it.

It must, however, be admitted that the etiology of nephritis is not consistent. Exceptional statements are also made such as that of a car-driver, 35, who never suffer from tonsillitis neither got wet nor caught a cold and who had good billets throughout the winter. On 24 April he saw the doctor because of pains in the lower legs and around the stomach, when moving about or running. A urine test was not made. Late in April his face got swollen, his breath was short, he suffered from fainting spells and an edema appeared Early in May he was admitted to the hospital, showing a marked edema and a rise of blood pressure. The diagnosis was as follows: Tonsils somewhat enlarged, purulent pustules. dental granuloma.

In any case, wetness and chilling alone can hardly be responsible for the disease although both certainly play an important part, either as the releasing factor or sometimes as the cause itself. In my opinion, in order to fight the disease from the etiological point of view it would be helpful to encourage the installation of Finnish Sauna Baths.

Statistical data on the etiology of nephritis according to HILDEBRAND:

Causes

	Angina	Skin suppuration	Suppuration in the accessory nasal sinuses	Injuries by cold with subsequent infections	General febrile infections	Severe injuries caused by intense cold	No recognizable cause
in one hundred cases	29 %	13 %	6 %	3 %	13 %	11 %	25 %
in two hundred cases	15 %	12,5 %	12 %	6 %	11 %	12,5 %	31 %

The figures of the column headed "No recognizable cause" refer to persons who for weeks and months had successfully endured extreme cold and thus withstood all hazards of catching a cold. From time to time the "louse exzema" became infected and finally in the throat suppurative foci developed repeatedly during the treatment. Cryptogenic foci of infection therefore play a considerable part even in these cases.

I would like to point to retronasal angina which is not always associated with dysphagia, and it should also not be overlooked that even in peace-time patients often denied having suffered from tonsillitis although they admit a slight dysphagia.

In summary: I believe that the etiology of war nephritis is infectious, and especially infection by streptococci, play the same important part as in the peace-time form. Cold and dampness play an important role as initiating factors. Certainly it is the influence of dampness and cold which very frequently mobilize the infection. Material on the subject is published in my contributions to the Manual and no doubt you will find my reports confirmed by your own experience. I myself recollect very well after breaking into the ice in thawing weather in my childhood, that I and also my brothers contracted angina the day afterwards.

It would be very desirable to have the anamneses of all cases of war nephritis taken down much more thoroughly and carefully and with more expert knowledge than is commonly done.

The attention of the medical officers in the units and hospitals should be directed to another and even more important matter, i.e. making an early diagnosis. This is the principal condition for an early recovery, i.e. recovery ad integrum. If diffuse nephritis is not cured completely in spite of a quite correct treatment it is usually due to a delay in making the diagnosis, i.e. in making it within the relatively short period where the histological changes in the kidneys will allow a retrocession.

An early urine test for albumin is usually neglected in "trench nephritis". Such carelessness is hardly comprehensible the more so as according to World War I, experience and many anamneses at hand, "trench nephritis" begins in nearly all cases with a marked edema. Therefore it is imperative to make a thorough urine test, because it must be kept in mind that the extra-renal syndrome of nephritis without albuminuria occurs not infrequently as described by NONNENBRUCH. Therefore the blood pressure should be checked, or in the absence of a sphygmomanometer the pulse rate should be noted.

An absolutely typical and especially frequent symptom of both the mild hypertension and the acute hypertension of nephritis is tiredness and weakness. Possibly this is also an indication of a general contraction of the vessels, including the vessels of the muscles.

Moreover it appears to be insufficiently known that the specific and abrupt change in the circulatory system, as is typical for acute nephritis is most frequently attended by shortness of breath, chest trouble, dyspnea while in motion and even at rest. This is constantly reiterated in practically all the anamneses at hand. Furthermore it should not be overlooked that the shortness of breath is due to cardiac trouble. This overstrain of the heart and the stasis in the lesser circulatory system is a most alarming symptom of immediate danger in acute nephritis and misjudging this state of affairs may have deleterious consequences. By far the greater part of the fatal cases of acute nephritis must be attributed to such failure of the heart in association with an edema of the lungs, which is manifested in shortness of breath and cardiac cough. If these seriously threatened patients, with swollen faces, gasping for breath, are subject to a hunger and thirst treatment in combination with intravenous injection of Strophantin really excellent and startling results are obtained, such as have never been seen before. The application of this therapy brings no relief to the kidneys, on the contrary they are induced to work efficiently again. Rather the tension is lessened in the circulatory system and the strain on the heart relived thus preventing heart failure due to dilatation.

Certainly this is not the only way to cure diffuse nephritis, but according to my experience it is the best, i.e. it is most reliable in preventing a dangerous course, besides it is the fastest method.

From clinical reports at hand it can be seen how much can be endured by nephritic patients, starting from long-distance runs despite nephritic dyspnoea to the prohibition of rest in bed, from taking Albucid to drinking tea of bearberry leaves and urotropin, or traveling sitting up in an unheated train, taking all kinds of salted food, etc. At the same a great part of these cases were cured, sometimes, however, only after many months stay in a hospital. Provided that a diagnosis is made in good time the hunger and thirst cure offers the advantage of enabling a surprisingly quick cure within 1 to 2 weeks. In consideration of the great number of patients this certainly is of much importance in military respects.

Furthermore the hunger and thirst cure offers also the advantage of being applicable wherever beds are available. Confinement to bed is necessary in any case and also a doctor well conversant with the treatment of nephritis. Since transport is harmful and delays recovery, the collection of all new cases of nephritis in specially erected barracks close behind the front near surgical or base hospitals should be considered and their treatment there according to the hunger and thirst cure (and with Strophanti until the edema is gone, the threat to the heart passed, and the blood pressure reduced.

Day by day control of the blood pressure is absolutely necessary, as the favorable issue depends almost exclusively on the reduction of the blood pressure to normal level, or better still below normal. If this aim is attained it is no longer a risk to give the fasting patient 1½ liter tea with 0.4 theocin, in order to accelerate recovery. Even if the blood pressure is not yet reduced but the threat to the heart is overcome, one can risk reducing the blood pressure by using a massive dose of water and sometimes an abrupt decrease of the blood pressure is observed.

Removing the patients to the rear or home hospitals where a diet appropriate to nephritis patients can be provided will only come into consideration after the hunger and thirst cure has been carried through. En route the patients should be berthed in heated hospital trains.

In those cases where no favorable reaction to the hunger and thirst cure results, i.e. no reduction of the blood pressure, tonsillectomy may be considered as a last resort. In this connection it should be pointed out that even an expert is sometimes unable to recognize from the outside whether or not any suppurative focus may still be inside; only the removal of which makes recovery possible.

A second serious threat in the acute hypertension of nephritis must be seen in the fact that the cerebral vessels are implicated in the general vascular contraction. The result is a cerebral edema and the appearance of cerebral pressure which anatomically shows a gradual swelling of the cerebral ventricles and in the characteristic cone-shaped prolapse of the cerebellum into the large occipital foramen, as in the case of a cerebral tumor. Clinically this menacing condition manifests itself in mental dullness and headache, now and then associated with vomiting, furthermore in a choked disc, or amaurosis due to an edema in the optic centers, or even in convulsions, i.e. a clinical picture conforming to eclamptic pseudo-uremia and equivalents. The treatment consists also in these cases in combatting first of all the hypertension, then in using - apart from the hunger and thirst cure combined with Strophantin - a general blood-letting with subsequent lumbar puncture. In order to diminish the excitability it will be necessary to administer a sedative, such as sodium luminal intravenously, and in order to have the brain freed from water, 20 cubic centimeters of a solution of 25 per cent of sulfate of magnesium may be injected intravenously. Yet it will be advisable to keep a syringe of calcium solution immediately ready for use to curb any possible undesired effect of the magnesium on the respiratory center. Those cases are to be considered suspicious of pseudo-uremia where in the beginning the patients complain of headache. Since applying the hunger and thirst cure such complaints are very seldom observed, and only during the absorptive stage of the edema.

As a third menace in acute nephritis the retention of the urine must be considered i.e. the appearance of anuria. Such cases are rare but of an extremely dangerous character. Apart from combatting the hypertension as has been described before, it will be advisable to apply heat locally to the

renal region, e.g. by hot linseed poultices or cataplasma of mashed potatoes, or else by intensive short-wave therapy twice daily for two hours. Controlling the urea values in the blood will be necessary. If by all these measures the retention of the urine cannot be reversed one should consider stimulating the kidneys by a deep penetration of X-rays, or by applying paravertebral anesthesia of the renal nerves, and lastly decapsulation of the kidneys.

Exlampsia of pregnancy being due to the same cause I wish to draw attention to the following way of treatment: BACH could see a striking success with a severely eclamptic woman, who had lost her sight completely, and suffered from somnolence and anuria after Caesarean section, by setting 24 leeches, 12 on each leg. Since then he has treated all cases of preeclampsia and eclampsia in the same way and thus has no more fatal issues due to eclampsia. He has the same good results by venesection plus intramuscular injection of 20 milligrams of Hirudin, 3 to 5 times within 24 hours. An abundant diuresis resulted with a corresponding reduction of the blood pressure. Since Hirudin is not on sale at present any other drug inhibiting coagulation of the blood will come into consideration, e.g. Heparin. If there are leeches available quite a number of them may be applied on both sides of the renal region instead of making a venesection Threatening oliguria or anuria may thus be curbed.

A fourth threat must be considered if the disease is not cured and becomes chronic. Under the favorable conditions of pre-war times an early diagnosed acute nephritis was cured at a rate of almost 100 per cent. What is the matter now with war nephritis? After World War I it turned out that hardly 50 per cent of the cases of war nephritis had been cured. Figures concerning the result of trench nephritis in the present war are not yet available. HILDEBRAND reports on his nephritis patients as follows:

Treatment: Administration of magnesium sulfate, thorough intestinal purge as is usual prior to a hunger cure, then fasting and thirsting for 6 or 8 to 15 days, 1 tablet of Vitamin C three times a day, now and then two tablets of Vitamin B_{3-2} and daily Strophantin; possibly venesection and renal diathermy. Effect: At first the edema is influenced, a loss of weight 18 to 22 to 32 lbs occurs within 8 to 10 days. Further treatment: Administration of "potato days", gradually increasing portions of vegetables, application of a massive dose of water, and finally curing of suppurative foci. Several very impressive cases have been seen. Result: 3.2 per cent of the patients died, but only 15 of nephritis proper; one patient died of a most serious edema of the lungs 18 hours after hospitalization, one of an eclamptic attack, another one - admitted to the hospital not earlier than 5 weeks after the outbreak of the disease - died of subacute "half moon" nephritis, another 2.2 per cent of the patients died of complications such as pneumonia, parotitis, sepsis etc. 2.57 per cent of all cases could not be cured, 8.65 per cent were transferred to other quarters, mostly for treatment of suppurative foci, 85.5 per cent were cured. This is in fact, a very satisfactory result considering that in contrast hereto in a reserve convalescent hospital only 36 per cent

were cured completely, and 61 per cent were dismissed uncured. These cases had been treated in other hospitals for a prolonged period and then they were moved to this health resort for another 4 weeks observation. In another reserve hospital which now is being run as a hospital exclusively for nephritis patients, 0.75 per cent of the patients died of severe nephritis, 42.7 per cent were dismissed as follows: Of the latter, 43.5 per cent of them were cured completely. 34 per cent with persisting defects and 22 per cent remained uncured. Of course any decisive conclusions cannot be drawn from these statistical data. They reveal at best that firstly, we have to reckon even now again with a great number of uncured cases of chronic nephritis tending to turn into secondary cases of contracted kidneys. It would certainly be worth-while to do everything favoring an early diagnosis and to treat nephritis at an early phase. Secondly, in order to obtain results as favorable as possible, all nephritic patients should be collected as close behind the front as circumstances will permit and then have them treated with expert care.

All suggestions made as a result of these investigations will be found in the directives, page 132 (No. 7 to 10). In addition special attention is invited to preventive and prophylactic measures in order to prevent damages due to cold and dampness (Sauna Baths).

2. Pathologico-anatomical bases for the concept of "War Nephritis".

Oberfeldarzt (Lt. Col., MC.) SPONHOLZ

Since World War I the clinicians regard "war nephritis" as the clear cut manifestation of a disease associated with edema, hematuria, and albuminuria, which under certain conditions occurs frequently in war-time. Thus it is the task for the pathologist to investigate this picture to see if it can be based anatomically upon a substratum with characteristic organic changes, which in regard to interpretation and special clinical processes correspond to the picture of nephritis known from pre-war times. All reports of the pathologists of World War I, in particular the exposé by HERXHEIMER in the Manual of Medical Practice of World War I came finally to the conclusion that from a pathologico-anatomical aspect the clinical picture of war nephritis corresponds to glomerular nephritis, which shows no variation from peace-time nephritis. At the last Conference (East) of the Consultants' Committee, in May of this year, RANDERATH came to the same conclusion. Meanwhile statistical data compiled by the Central Archive for Military Medicine could be made more complete. They now comprise all findings on the subject since nephritis first appeared in this war. I undertook the trouble once again of looking through all these 355 reports, taking into due consideration all the views expressed by the clinicians which repeatedly said that the disease may perhaps be due to infection by some virus. In excluding all

such cases as were suspicious of being associated with a focal infection, and going so far in this respect as to eliminate all cases of wounded soldiers and those with frostbites it was my endeavour to find mutual bases with the clinician and to examine the unsolved problems from that standpoint. I found, by separating them out, 136 unobjectionable cases of nephritis. Reports on the result of these examinations are submitted herewith. My own practical experience in the Reserve Field Hospitals, Group A in Southeast Poland is restricted to 14 cases in all, a very small figure indeed. However, excepting Group B with 17 cases which came next, it is the highest figure met with in the whole area of the same army. With the exception of 3 cases all reports originate from the East - as far as can be determined from records of home hospitals. Considering the small totals of the separate figures in the respective armies they are of interest only after being combined according to the area of the front sectors. Accordingly the death toll of war nephritis shows the following distribution:

Northern Sector	8 casualties
Middle Sector	25 casualties
Reserve Field Hospitals, Group B	17 casualties
Southern Sector	17 casualties
Reserve Field Hospitals, Group A	14 casualties
Balkans	3 casualties
Home hospitals	52 casualties

The widely differing figures in the separate sectors of the front can be interpreted in various ways. I believe the low number of casualties in the Northern Sector is due to the fighting forces in that sector being the closest to the large hospital bases and difficulties of transportation having been less in comparison to the other sectors, at least as far as the patients' period en route is concerned. The incidence of the highest figure of casualties in the Middle Sector inclusive of Reserve Field Hospitals, Group B, explains itself because of the military operation which took place all winter in these sectors. On the other hand in the hospital base of Southeast Poland the first collecting hospitals of the Southern Front were included and these could be reached only by an extraordinarily long route of transportation rearwards and by most primitive means of transportation. Of those patients who died in home hospitals it could seldom be determined from which sector of the front they had come.

Anatomically this group of nephritis showed the kidneys either pale or colored and enlarged, so far as uncomplicated cases came into consideration. Any difference from peacetime nephritis could not be detected. Most frequently the remarkable edema of the skin and the inner organs, and especially the edema of the lungs, was predominant. It was very frequent

and striking that serous exudation tended to secondary infections and this may be due to the reduced biological defense status of the body. Frequent appearance of enteritis and bronchopneumonia should be interpreted in the same way.

There has been a special group of strange sudden deaths, Quite unexpectedly a man fell ill, afflicted with a severe edema, or looking as if there was a sudden failure of the circulatory system. Death occurred within 24 hours. Autopsy revealed in all such cases acute nephritis as a primary cause. The immediate cause was uremia in some cases whilst in others one had the impression that it was caused by an acute dilatation of the heart. Such sudden deaths due to acute nephritis are not characteristic of war nephritis, yet they make us consider the matter. In my opinion the fatal outcome could have been avoided if the medical officers in the units had used greater care in observing the initial symptoms. A great many of these deaths occurred immediately after transportation. In fact the death-rate of nephritis in temporal or causal connection with transportation is frighteningly high.

As is apparent from all reports that the exarination of the kidneys showed the microscopic picture of an acute or subacute glomerular nephritis. The capsular spaces were tightly filled up, the loops were rich in cells and more or less infiltrated with leukocytes. In the beginning the capsular epithelium was not affected, only in a later phase does the formation of "half moons" (casts ?) begin, but never to an extensive degree. Therefore in all cases the intracapsular form of glomerulitis was concerned, distinguished now and then by its stability and by lack of tendency to glomerular obliteration. In quite a number of cases the beginning of the disease dated as far back as 3 and 3½ months. All the same even in these cases no damage of the kidneys, such as contracture, could be observed. For the first 3 to 4 weeks the tubular epithelium showed only minor changes, in later stages it began to show signs of degeneration and cloudiness of the protoplasm was observed, and in addition a slight adiposis and occasional formation of vacuoles appeared. However, from a clinical aspect these tubule changes are not very important as compared with the damage due to severe nephrosis.

In general the presence of blood in the capsular spaces and tubules was trifling and in no way influenced by the duration or seriousness of the disease. Those cases in which the surface of the kidneys showed a flea-bitten like, dotted appearance indicate a more hemorrhagic character of the disease and were in the minority.

A special group within that group is war nephritis associated with typhus. It leads to diffuse glomerulo-nephritis of a most dangerous hemorrhagic character. It is of no importance and often cannot be decided clearly in which order the two diseases follow one another. It is affirmed by many clinicians that such cases imply a very grave prognosis. They must be distinguished distinctly from diffuse glomerulonephriti which incidentally occurs in typhus, though in my opinion seldom. RANDERATH and HERZOG state, in contrast hereto, that

they had observed it in 25 per cent and 67 per cent respectively of all cases of typhus. Concerning the alteration of the permeability of the renal capillaries in war nephritis associated with typhus, it may be due to the damage done to the vessels in general by the typhus. In case of an additional interference with the causative agent of war nephritis, a particularly high-grade of erythrodiapedesis results.

Although it can be concluded from all these investigations that, from a pathologico-anatomical or histological aspect, a clear cut distinction between war nephritis and the peacetime forms of this disease cannot be made, one must not exclude the possibility of a particular, maybe infectious, etiology for war nephritis. Quite a number of clinical indications imply unequivocally that such an assumption is correct. Experimental tests made by MASUGI point to some kind of allergic reaction. Eventually a particular disposition of the body may exercise some influence, a factor which should not be underestimated. All this, however, does not give us any basis for medical action, the more so as the nature of such peculiarities of disposition are apparently still very much in the dark.

I pointed out in my report that certain anatomical findings ordinarily indicate a decline of the defensive power of the body. Exhaustion may come into consideration as an important although not causative factor, it deserves attention A fact which may be of much interest is that war nephritis was well known to the French and English during World War I, whereas captured and civilian Russian doctors, who have been questioned upon the subject this summer, had no knowledge of a special "trench nephritis". Any increased frequency of nephritis in Russian prisoner camps is also not known to me. It would appear as if war nephritis were a typical disease of certain standards of living due to too great a susceptibility of the human organism.

In summary I wish to suggest: 1. More blood pressure tests in series should be made on troops relieved from the main defense line. This would give an idea, even if only rough of the status of the tonus, which permits one to draw general conclusions on the general defensive status of the body. More thorough examinations would be impossible. 2. In order to define the concept "war nephritis" more clearly from those forms of nephritis that arise from focal infection, special attention should be directed to a potential focus when reviewing the anamneses and findings on all nephritis patients when admitted to the hospital.

Discussion:

BOEHMIG: Early deaths due to "trench nephritis", occurring 8 days after the manifestation of the first clinical symptoms, show a marked swelling of the loops of the glomeruli, yet no increase of cells, and a high-grade anaemia of the loops. In accordance with the observations made by VEITH we found the similar slight homogeneous swelling of the loops as a sign of

the general effects of cold without or with local injuries. In addition there was simultaneously considerable albuminous secretion in the curled uriniferous tubules, due to chilling. Chilling apparently causes some sort of glomerulonephrosis.

BUECHNER: 1. No acute glomerulonephritis could be observed in 20 cases of chilling, yet albuminous cylindrical scars were in the tubules and droplet-like accumulation of albumin in the main parts of the epithelium. 2. In animals exposed to chilling we found similar observations. 3. In rabbits, the renal region of which was exposed daily for a prolonged period to severe chill, we could not observe any glomerulonephritis, but only an excretion of albumin.

MUNK: During the last war, I was able to study on ample material the clinical and anatomical manifestation of renal disorders in various infectious diseases including cholera, malaria and "five day" fever. Briefly, the result was that glomerulonephritis could not be found in any of these acute infectious diseases. Of course the various anatomical renal changes frequently showed the glumeruli to be involved. Hemorrhages occurred and also a considerable exudation of cells and the formation of crescents (casts) in the glomeruli, as especially noticed in some cases of severe grippe. Anatomically, therefore, the glomeruli frequently showed an inflammation, apart from other changes. Yet such renal changes must not be considered to be glomerulonephritis. Under that name we understand a certain clinical picture marked by more or less conspicuous acute swellings, which extend not only over the renal region but also over the capillary system of other organs especially the brain. Secondary inflammatory symptoms are added to these swellings, so in chronic cases an extensive inflammation of the connective tissue, in short, a contracted kidney is developing. Such an issue can never be the consequence of renal changes which were caused by all acute infectious diseases, typhus and malaria. Sometimes both acute and chronic glomerulonephritis happens to occur simultaneously. It is of the utmost importance to distinguish clearly between those changes caused by acute infections in the glomeruli and the true glomerulonephritis in the clinic. Otherwise all therapeutic measures which are required only in the case of glomerulonephritis might also be applied in the other case. Apart from scarlet fever I know of only one infectious disease which causes true glomerulonephritis, it is impetigo contagiosa. This shows that the skin is an important factor from which streptococcic infections, such as paronychia, may be the cause of glomerulonephritis. It would appear as if the streptococci are no sooner in the lymphatic vessels than they gain virulent power to cause true glomerulonephritis, the special feature of which is a general swelling of the capillaries.

BERG: Patients arriving from the Eastern Front and suffering from edema are now and then automatically subjected at first to another hunger and thirst cure after being moved to a new hospital. In order to avoid the possibility that non-nephritic patients suffering from hunger edema, as occurred in the case of troop units which were encircled for a long

period, are subjected to a further damage due to the hunger and thirst cure, attention should be paid to an exact diagnosis as to the origin of the edema. This may be assisted by the table of my coworker BERNING (Militaerarzt, 1942), dealing with the differential diagnosis of diseases accompanied by edema.

Stimulated by a publication of GAISBOCK, I succeeded in curing war nephritis rapidly in a phase of eclampsia, oliguresis and albuminuria by intravenous injection of adrenalin at the v. BERGMANN clinic as long ago as 1919. Following an additional increase of the blood pressure due to these injections, associated with an alarming arrhytmia lasting for about 20 minutes, there was a rapid discharge of urine as clear as water and free of albumin from that moment on, succeeded by an astonishingly quick recovery. Retrospectively this may be explained by the recent investigations made in regard to MASUGI nephritis.

MUNK: 1. Not infrequently a quite unusual anemia forms a striking feature. It often shows a hemoglobin value of less than 50 per cent. This cannot always be proven at the initial stage of the disease, but frequently only in the course of the treatment or convalescence, and it is very difficult to cure. Deficiency of iron in the blood, due to the infection, is the probable cause.

2. It is extremely difficult to determine whether or not the disease is cured. Therefore particular care should be devoted to its treatment, for if it is left uncured it will progress continuously, causing death in consequence of renal insufficiency.

Blood pressure, albuminuria, hematuria, and power of concentration are not absolutely reliable symptoms in each individual case. Cure will be possible even as late as 6 months after the onset.

HORSTER: In North Africa, bacillary dysentery and hepatitis occurred frequently, just as in the East. There were many skin infections by streptococci and staphylococci, but no damage due to cold or dampness. No nephritis was observed.

SYLLA: Bacteriological urine tests showed up to 80 per cent positive findings, usually hemolytic yellow staphylococci. In the simultaneously present pyodermia the bacteria found in the suppurative pustules and in the urine corresponded in almost 100 per cent of the cases. "Trench nephritis" is considered to be an antigen-antibody reaction. Sensitization is caused by some kind of infection, whereby the particular kind of germ may be a decisive factor. Damage due to cold in all probability favors infection and this leads to temporary bacteremia and bacteruria. Nephritis could be the reaction to the entrance of bacteria. This matter urgently requires further investigation.

VOLLHARD: I would suggest testing the urine for staphylococci even though pyodermia is not associated with nephritis.

Directives:

1. "Trench" nephritis basically shows no distinction from acute diffuse glomerulonephritis of peacetime. However, the edema is usually more marked and thus represents an early symptom.

2. The typical complex of symptoms includes edema, blood pressure increase, albuminuria, in some cases is irregularly present. Monosymptomatic forms also occur.

3. Pathologico-anatomically the picture of a typical glomerulonephritis is shown; in fresh cases the degenerative changes in the tubules are less marked in comparison to the pronounced nephrotic aspect of the clinical picture.

4. As to the development of the disease some predisposition may play a role, due to dampness and chilling, yet this need not necessarily be the case. Infection may also play a part either by known (streptococci, staphylococci etc.) or unknown agents (viruses).

5. In December, the disease increases in frequency, the climax is in March-April. Single cases are spread throughout the entire summer.

6. In most cases the disease will progress favorably, provided it is recognized early and treated with expert care, and additional damage is prevented.

7. For that reason it is necessary to instruct and inform medical officers of the units regularly of early diagnostic symptoms (dyspnoea, tiredness, headache, pains in the chest, putty-colored face) and their colleagues in the hospitals of the way the disease must be treated. Whenever there is an increase in frequency of renal diseases it is necessary to test the urine for albumin, and whenever possible to measure the blood pressure of all sick and wounded patients, especially of out-patients and of those suffering from ill-defined general troubles.

8. Whenever possible the patients should be treated in medical units close behind the front, transportation being harmful both to new cases and to those in an initial stage of treatment.

9. The treatment consists in immediate confinement to bed and application of heat. After a purgative dose of castor-oil or magnesium sulfate, a thorough hunger and thirst cure should be made, with tea or fruit-juice days (750 cubic centimeters a day) and a fruit and apple-rice diet to follow. After the edema is gone and the blood pressure has returned to normal a saltless and meat less diet, poor in fluids (1000 cubic centimeters) should follow. Bread and butter must be free of salt. In the case of dyspnoea and high blood pressure ¼ milligram

Strophantin may be administered, up to two times a day, even if the pulse is slow. In the case of oliguria and anuria the application of 10 to 12 leeches in the renal region will promise good results. In more acute cases of "trench" nephritis it is by no means allowed to treat the edema with mercurial preparations. If the decrease of the blood pressure and of the edema is delayed, a massive dose of water may sometimes be of advantage, yet only after the definite disappearance of the symptoms of the circulatory system. The hunger and thirst cure should not be repeated ad libitum, but only in the case of obstinate residual conditions or if an acute turn for the worse takes place.

10. Nephritic patients should not be transported before the edema is entirely gone and only after the blood pressure has become normal. In order to assist the medical officers of the evacuation units in identifying the nephritic patients at first glance, they should be marked by tags showing the inscriptions: "Trench" nephritis, confinement to bed, saltless and pulpy food, restrict fluids. Care should be taken to keep the patients warm en route. After the edema is gone and the blood pressure normal again the patients should be moved to suitable home hospitals, berthed in hospital trains and subject to diet restrictions. Also on this route the tags should be left on.

11. Ordinarily the cleaning up of a focus of infection will not be indicated, neither in an early nor a late stage of "trench" nephritis. In the case of residual hematuria, a persistent elevated blood pressure and a tendency to recurrences treatment of the infectious foci may contribute to the final recovery.

12. Even after all clinical symptoms have disappeared, nephritic patients will need another 3 months' time before being fit for duty again.

XI.

INFLUENCES OF CLIMATE AND OF NUTRITION IN AFRICA; SCURVY

Translation prepared by:

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1. Influence of climate and kind of nutrition of German soldiers in North Africa.

Stabsarzt (Captain, MC.) Prof. HORSTER

Up to now the operations in North Africa took place in a territory of typical Mediterrean climate: Dryness, hot temperature, mild winter weather, and intense sunlight. In the dry, slightly agitated air, the necessary radiation of body heat is generally guaranteed. Acute injuries by heat are, therefore, very rare. Tetanic (chlociprivic) states are often observed during the hot season. Many healthy soldiers are found during the hot season with a hypotonia, which, however, does not cause subjective troubles. As a matter of fact, complaints are often reported about abnormal physical and mental tiredness, dizziness, particularly when getting up, violent beating of the heart, dyspnoea, angina-like troubles, disturbed sensitivity of hands and feet.

Findings: Respiratory arrhythmia, irregular heart sounds, in particular above the pulmonary arteries, enlarged but not pathologically dilated heart, slight evanescent edemas of the lower extremities. The EKG frequently shows a steep, vegetative T, sometimes prolonged transition time or a broad P. The examination of the regulation of the circulation according to SCHELLONG often showed the following result: Drop of the systolic pressure following a primary increase of about 20 millimeters and more; after physical exertion, the increase of blood pressure does not occur when the patient is standing. Analogous observations were made 40 years ago in the German Colonial Troops in South Africa, according to the literature. Our examinations on South African negroes at Tobruk showed normal regulative conditions of the circulation. The insulin test showed in some soldiers suffering from hypotonia a defective counter-regulation (hypofunction of the chromaffin system). This lability or insufficiency of the peripheral blood circulation is considered as the result of an exhaustion of the neuro-hormonal system, in consequence of the long lasting, unusual and additional stress on the heat-regulation. While judging and treating infectious diseases of all kinds in hot climates, this lability of the blood circulation is of great importance. The administration of small doses of ephetonin for a longer period has shown good results.

Serious aftermaths of commotio are very frequent in hot climates. Patients with definite commotio are in hot climate not fully fit for service for at least 6 months to 1 year.

During the hot season the high susceptibility of the skin to all kinds of infections due to dirt proves to be most hazardous with respect to the combat efficiency of the troops. In summertime, round or bean-shaped ulcers, usually on the legs, with slight formation of pus and a black, central necrosis, following trivial skin injuries appear epidemically. There is little or no healing tendency. In my opinion the above described disturbance of the regulation of the circulation which is associated with an extravasation of liquid into the tissue, provides the conditions necessary for the

spread of indicental infections of the skin, particularly on the lower extremities. The protection of the legs by wearing long trousers or high boots, as well as an immediate treatment of injuries of the skin, even the most trivial ones is of prophylactic importance. Therapeutically, the restoration of the local conditions of the blood circulation is important.

We know from experience that the function of the digestive organs is reduced in hot climates. Digestive complaints are much more frequent. Sub-acidity, respectively anacidity is frequently observed in our soldiers in North Africa. Food difficult to digest such as legumes in particular are, therefore, poorly tolerated. The bacteriologic picture of the intestines changes in most cases, numerous protozones are observed in the stool. Systematic administration of (HCl) hydrochloric acid (Acidol-Pepsin) helps to overcome these disturbances in a very short time. Prevention, respectively treatment of these dyspeptic symptoms by an appropriate diet is important to avoid subsequent infectious diseases, including amebic dysentery.

The soldiers diet in hot countries has to take into consideration the climatic conditions. The food must be easily digestible, appealing and provide the necessary variety. The salt lost by perspiration must be replaced. A diet, rich in carbohydrates, and possibly served in several small meals, proved advantageous in cases of a hypotonic syndrome. Butter should be given preference to cover the fat requirement of the body. Lard or bacon are less suitable during the period of the warmer months. The best source of vitamin C is lemons. Fresh potatoes will seldom be available . (Further details appeared in the Field Cookery Manual for hot countries, 1942).

Our observations led to the following, practical conclusions:

1. Only older soldiers of the Regular Army, minimum age 22 to 24 are eligible for service in hot countries.

2. A transition period for mental and physical adaptation should be provided before combat assignment in hot zones.

3. An interruption of the assignment in hot zones should take place after 12 months of service to secure the restoration of full efficiency of the soldier by a period in the homeland.

4. Careful observation of all hygienic measures among the troops.

5. The field surgeons must be well advised about the significance of the various kinds of complaints of the blood circulation. (Best of all by attendance at a course in tropical medicine.)

6. Special caution is to be observed with regard to transportation of patients during the hot season, because of the ever present danger of collapse.

7. As severe cases will recover ad integrum very slowly in hot climates, evacuation to the homeland will as a rule become necessary.

2. Cardiac findings among soldiers of the Africa Corps.

Oberstabsarzt (Major, MC.) Prof. KAEMMERER

(Observations on the report of Stabsarzt (Captain, MC.) Prof. HORSTER).

We were directed to examine soldiers, returning from Africa and complaining about heart troubles, by exact, clinical methods with the chief object of establishing, whether or not a B1-hypo-vitaminosis could be responsible for alterations of the heart. The calculations of the food based on statements of the patients showed that the B1 content according to the formula of WILLIAM and SPIESS clearly exceeded the minimum value of 0.3 in all patients, and amounted in all instances to 0.35 to 1.1. As a matter of fact, none of the cases in the past relatively mild summer and autumn, with regard to the war events, showed no evidence whatsoever that a B1 hypo-vitaminosis had been the dicisive factor in a clear cut heart disease. Only 16 per cent of the cases had a clear cut cardiac disease. 56 per cent showed no change of the heart at all; the rest showed a more or less vague suspicion of an impaired myocardium or only symptoms of vascular lability, hypotonia, vegetative neurosis, or mild thyreo-toxicosis.

It is, of course, not entirely impossible that a B1 hypo-vitaminosis may be considered in some cases to be acting simultaneously. This has to be considered, especially in patients, who owing to a long standing involvement of the gastro-intestinal tract has hindered the absorption of vitamin or if infections absorbed the B1 reserves to a great extent. Such possibilities have to be taken into consideration especially as our soldiers in Africa, have not infrequently been suffering from long-lasting dysentery, diarrheas and impairments of the ferment-secretion. It seems that dysentery may be held responsible in many cases for cardiac diseases. The African climate in itself cannot be considered as the decisive factor for the heart troubles of our patients. But still, it seems that soldiers, who are susceptible to neurosis, vaso-lability, thyreo-toxicosis, have to suffer particularly from this climate with its sudden changes from hot to cold, its sandstorms, etc. Soldiers with a previously defective or susceptible heart will, of course, show objectivly recognizable defects much easier than in their customary climate. Importance must be attached to infections, of which probably dysentery, hepatitis epidemica, angina and diphtheria play the most important part.

In contrast to these cases, admitted to our hospital during this summer and early autumn, in which heart troubles caused by B1 hypo-vitaminosis were very few, I had within the past weeks, since the period of heavy combat in Africa, the opportunity to gain more impressions in various hospitals of our Military District. There are lately quite a lot of patients from Africa who, in spite of a severe dysentery, often had to endure a strenuous long evacuation. Nearly all these patients told us that, because of their very poor appetite, their food intake was very insufficient. Furthermore we had to suppose an insufficient absorption of vitamins, because of the severe diarrhea. A great number of the patients complained about paresthesia in the legs and an extreme sensitivity to pressure of the nerve trunks and also about a considerably reduced, flabby musculature, besides an excessive atrophy of the fat cushion and a serious myasthenia. That is to say these patients exhibited clear cut symptoms of poly-neuritis. Some of the patients exhibited symptoms of funicular myelosis and a great many had edemas. There is hardly any doubt that these conditions are synonymous with post-infectious B1 hypo-vitaminosis, having its origin in an insufficient absorption and insufficient supply of food due to anorexia. A great many of these cases from Africa were transferred to the homeland with the diagnosis "insufficiency of blood circulation", and this fact clearly indicates that already in Africa there were certain symptoms of complaints of the heart and of the circulation. There also were symptoms of weakness of the myocardium and the blood circulation of a great many cases in the hospitals of our Military District; but still, more exact analyses could not yet be made in our hospital.

The examinations hitherto made seem to confirm that heart troubles due to B1 hypo-vitaminosis can hardly be considered as a consequence of the African climate or of an insufficient or inappropriate nutrition in the theater of operations, but heart troubles have occurred lately in many instances as an aftermath of dysentery and possibly other infections too.

3. Scurvy.

Stabsarzt (Captain, MC.) FAEHNDRICH

The speaker submits a report about the treatment of 83 patients aged from 20 to 50 suffering from scurvy *) who clearly exhibited - some in a severe form - spongy gums, superficial and deeply located hematomas, small or large scattered hemorrhages into the cutis and disturbances in gait so that the cases had to be considered as clear cut avitaminoses. The determination of the vitamin C contents

*) The experimental examination has been made by the Institute for Physiological and Military Chemistry of the Military Medical Academy (Oberarzt (1st Lieut., MC.) GRAB).

of the bloodserum at the beginning of the therapy showed in all patients 0.00 mg per cent. The patients involved were in a bad general condition of health due to hunger and fatigue and often suffered from additional infections.

Therapy. The patients were given in the beginning a diet consisting of 1800 calories, however, without vitamin C and with 50 grams of protein, the latter of biologically high value. A daily dosage of 10, 30, or 60 milligrams of ascorbic acid in the form of lemon juice was given to three groups of 30, 30 and 23 patients, as tablets by mouth or as intravenous injections.

Result. 4 to 12 days after the beginning of the therapy the changes, especially of the gums, were considerably improved; severe hemorrhages into the cutis or into the tissue as had been observed in a large number of cases prior the therapy were not observed any longer. After 4 to 6 weeks, a recovery ad integrum of scurvy was achieved in all cases. It is especially important to note that the clinical success of the treatment occurred in all patients regardless of the dosage and the administration of vitamin C. (Yet the general condition of health was not as good as it should be, in that the patients continued to lose weight for the time being. By increasing the intake of calories to 3600 and that of protein to 100 grams daily, an average increase of weight of 6 kilograms was achieved within 2 months). It is particularly striking, that the vitamin C content of the blood of all patients including those who received dosages, did not appreciably increase during the treatment, and remained at an average of below 0.2 milligram per cent towards the end of the eleventh week. The value of 0.4 milligram per cent which is considered as a "poor value" by most of the authors, was not even approximately attained.

Conclusions. It has been observed that even small, daily doses of vitamin C are sufficient to cure even severe cases of scurvy; doses that only present a fraction of that amount which is considered as a normal requirement of the healthy organism are sometimes sufficient. It may be taken for granted that the same dosages, by which scurvy can be cured, will also suffice to protect the organism against scurvy. It is doubtful, however, whether an organism supplied only temporarily with an insufficient amount of vitamin C or none at all is really endangered to a notable extent as is generally maintained. Such vague concepts as "primary", "secondary", "relative" hypo-vitaminosis - as previously considered - become still more problematic in the light of these findings. A deficient supply of vitamin must obviously exist a rather long period and furthermore be associated with other particularly unfavorable circumstances (such as strain, infections, hard physical work) before scurvy really sets in. If this were not true, there would hardly be an explanation for the fact that we are not aware of a considerable number of scurvy cases, neither of the civilian population nor in the German Army, although it seems to be doubtful that in the now wide spread system of mass cooking more than 10 to 20 milligrams daily of fragile vitamins which are only contained in a few food-stuffs are actually being served.

These observations are, of course, only intended to refute exaggerations and we are far from speaking in favor of a reduced supply of vitamins. The scurvy epidemics in the years after 1916 are particularly recalled. A well-balanced, well-prepared and immediately eaten diet is not only desirable, but highly necessary.

Discussion:

KOCH: Has made a postmortem examination in some of the described cases and has verified that the scurvy was cured. This became evident first by the color of the exanthematous scurvy, which is not red or blue-red any longer, as during the period of hemorrhages, but changes into a small-spotted dark-brown (Haemosiderin!); and secondly the healed scurvy is proven according to ASCHOFF by the extensive, nearly mahogany-brown deposits of pigment which are found on the fascia and in the cellular tissue of the lower leg. The alterations of the gums must not be considered of primary importance; they are rather co-ordinated to the hemorrhages of the fascia and the tissue. (They are not an absolute symptom of scurvy.) They may, however, turn into stomatitis by a mixed infection (particularly apparent with carious teeth), which may lead to most severe gangrene of the gums and further to furuncle-like, most intense metastases spreading from the mouth into the mucous membranes of the intestines, where the follicles are effected similarly to what is seen in PLAUT-VINCENT's angina. A further symptom of healed scurvy are the closed separations of the epiphysis in the centers of growth of the bones, which can be traced even on adults of 20 years age who suffered as a baby from MOELLER-BARLOW's disease, which is synonymous with early scurvy in babies.

GUTZEIT: Underlines the conclusions of FAEHNDRICH. The supply of vitamin shall certainly not be neglected in the German Armed Forces. If, however, 10 milligrams of ascorbic acid are sufficient to cure scurvy, a much lower dosage is certainly sufficient for prophylaxis and this is surely present in the every day diet of the German soldier. It is important that neither the so-called C-deficiency nor the vitamin C-level in the serum may be considered as a criterion for the diagnosis of scurvy. The opinion which is maintained by some physicians, that hemorrhages of the gums must necessarily be due to C-hypovitaminosis, is certainly erroneous. It is quite certain that the hemorrhages of the gums due to paradentosis cannot be averted by vitamin C unless it is intravenously injected in large doses. It is then effective as a drug and not as a vitamin per se.

FIKENTSCHER: Frequently and especially in the troops on duty in the north, the mistake was made to consider any hemorrhage or inflammation of the gums as a pre-scurvy symptom. The physicians should, in every case refrain from letting such assumptions reach the soldiers or officers in the command as this could immediately rise to false and alarming rumors, which in turn will be repeated in the letters to the homeland. Fortunately, scurvy so far has not attained any significance in the whole German Army and precautions have been taken to ensure that in the future no danger will develop in this respect.

XII.

L U E S, G O N O R R H E A, S C A B I E S

Translation prepared by:

Office of Military Government for Germany (U. S.)
Office of Naval Advisor
Medical Section

The directives stated below cover the essential part of the reports presented on these subjects. Therefore it can be dispensed with to go into details concerning the individual statements.

1. Salvarsan poisoning.

Oberfeldarzt (Lt. Col., MC.) Prof. LOEHE

During the last years alarming reports have been made concerning Salvarsan poisoning during the treatment. These reports are unjustified and exaggerated. This is evidenced by a statistical inquiry made by SPIELHOFF in July 1942 and by practical experience in clinics, large special wards and military hospitals.

It is not the lues which is to be treated but the lues patient. This means to consider individually the state of health of the particular diseased person before and during the treatment, in establishing the dose of the drugs, and to observe the sequelae of the injections. Due consideration should also be directed to preceding and intercurrent diseases, especially malaria, dysentery, liver troubles, influenza, papatacci fever and renal diseases. A Salvarsan course in combination with bismuth preparations is indicated, starting with 2 or 3 injections of bismuth, and the weight and urine must be regularly observed, as well as the appetite and sleep. Salvarsan is injected at intervals appropriate to the condition of the individual (3 - 5 days). For each course the total dose of 6.0 grams, and 15 - 20 cubic centimeters of bismuth must not be exceeded. According to the check tests of the seroreaction of the blood further courses are to be made at intervals of 4 - 6 weeks. In the first stage of seronegative syphilis, 3 courses will be necessary, in secondary lues more (up to 5). A single dose of Salvarsan must not exceed 0.6 grams. Each dose must be dissolved separately and must be injected with the patient lying down with the upper part of the trunk bare to permit observation of any possible appearance of a cutaneous eruption in order to avoid any possible irritation of the skin. In order to make it more tolerable to sensitive patients Salvarsan should be injected along with a 20 per cent solution of glucose.

In the course of a Salvarsan-bismuth treatment the following side-effects may be observed:

1. Angioneuritic complex of symptoms,

2. Exanthemata or even as severe as dermatitis,

3. Hepatic complaints including jaundice and acute yellow atrophy of the liver,

4. Purpura cerebri,

5. Hemorrhagic diathesis,

6. Agranulocytosis.

By extending particular attention to apparently insignificant initial symptoms (isolated spots of bleeding, nosebleed, hematoma) and by having always in mind the chief principle: "Treat the individual" most cases of severe damage may be prevented.

2. Chemotherapy of gonorrhea in the Army.

Oberfeldarzt (Lt. Col., MC.) Prof. GOTTRON

Gonorrhea is treated with sulfonamide preparations, especially thiazol preparations such as Eleudron and Cibazol, while the other types should be excluded whenever possible. The treatment is carried through by massive doses during 2 or 3 days, the daily prescription being 5 x 2 tablets. Local treatment should be dispensed with under these circumstances. No more than 3 massive doses are of use. Should the first course fail, another course after an interval of 4 days should be given. If the failure recurs a third course is required in combination with an alternative treatment (vaccine, pyrifer, olobintin 40%), consisting of 5 - 6 injections of pyrifer with the third massive dose of Eleudron or any similar preparation to follow. Confinement to bed is imperative. The tablets should be taken along with an ample supply of fluid and under observation. The simultaneous intake of sodium bicarbonate and sulfonamide preparations is not advisable.

Patients afflicted with gonorrhea should always be cared for in hospitals. Ambulatory treatment cannot be advised. "Prophylactic treatment" in the absence of an microscopically certain diagnosis is prohibited. As to the few remaining failures the long-established classical local treatment with thorough irrigations and injections should be resorted to, supplemented by surgical intervention if necessary.

When treatment is finished a test period is necessary by using provocative means; as a rule 6 days will suffice for the purpose.

3. A rapid form of treatment for scabies.

Marinoberstabsarzt (Lt. Comdr., MC., Navy)
Prof. BIRNBAUM

For a diagnosis of scabies the presence of ascarus burrows is unobjectionable proof. Better still is the microscopic evidence of the mites themselves, or their eggs. Scabies may be treated in wards or sick bays, yet in the latter case disinfection of the laundry ought to be assured under all circumstances. Ways and means for the treatment of scabies depend on the economic conditions created by the war. At present sulphuretted vaseline 30% is indicated only if the skin is intensively irritated or in the case of extensive secondary changes of the skin. Two stage treatment with first a solution of sodium thiosulfate 40 - 60% and a subsequent application of a solution of hydrochloric acid 60%, during 2 - 3 days, may be recommended, twice daily. The solution of sodium thiosulfate (showing a yellowish-shite coat on the skin) must be applied thoroughly and must be left to dry for some time, thus preventing the hydrochloric acid spread on afterwards from causing injury. Another remedy is Vleminxgk's solution, which is brushed on for half an hour, baths have to precede and follow its use.

There is no danger for scabies spreading within the area of our homeland as widely as it is in France at the present. All the same its appearance should be kept under special control, as in wartime it may easily spread.

In order to get reliable statistical material concerning the frequency of scabies it is suggested to have scabitic patients listed separately under serial number 25 in the army and hospital records of diseases.

XIII.

PROCEEDINGS OF THE CONSULTANTS' COMMITTEE ON PSYCHIATRY

Translation prepared by:

Office of Military Government for Germany (U. S.)
Office of Naval Advisor
Medical Section

Psychic irregularities associated with typhus
(See Section VI, Article 3)

A. Psychogenic Reactions.

1. Hysterical reactions in the Field Army.

Oberarzt (1st Lieut., MC.) Dozent MIKOREY

As compared to World War I hysterical reactions in the Field Army during the present war are rare so far. They amount to less than 10 per cent of the admissions to neurology departments. In armies on the attack they are very rare. They are a little more frequent at stabil front lines and in the rear areas. Among the different symptoms the mild or easily influenced syndromes predominate. Various forms of debility are common while serious convulsive trembling is relatively rare.

Early treatment in the area of the army group is decisive for the further progress. By a professional reassurance and consequent treatment the fixation of fright reactions etc., and hysteria are avoided. From the very beginning, the hysterical reactions should be kept away from any sounding board and it must be clear that it does not lead to any considerations worth striving after. The treatment is to be performed as much as possible under the control of the army group. Most hysterical reactions have proven to be easily influenced by therapeutic measures. After a subsidence of a first mild reaction the patient may be transferred to the fighting troops again. But it is to be discouraged that hysteriacs with serious and obstinate reactions are returned to the fighting troop, because they may become panic centers. They should be ordered to the Labor Service in the rear areas. By no means should they be discharged as unfit for military service, in order that no incentive for imitation be given to draft dodgers. Such serious hysterical reactions, which are not at all amenable to therapy, should be interned in public sanatoria during the war, because of the psychic infection danger.

Discussion:

Stabsarzt (Captain, MC.) Dozent BUESSOW: The lecture has shown, that the principles of dealing with the problem of hysteria are clear. I have found everywhere the same attitude in the Consultants' Committees of the Field Army. I also have observed the overlooking of coarse hysterical cases in favor of the finer ones. There are difficulties concerned with the evaluation of these finer syndromes, mostly projected to an organ, as non-psychiatrists are inclined to overestimate minor organic findings. The alternative question "psychogenic or somatic" is asked and is decided, on the basis of insignificant organic findings, to be somatic.

I also have the impression, that in such cases the patient's attitude towards his suffering conditioned on his personality and his background is not always given enough attention. In such cases the psychiatrist is able to assist the internist especially regarding the judgement of the patient. It seems to me to be of a special importance, that we facilitate the understanding of our diagnosis to the non-psychiatric trained physicians by a clear and, as much as possible, uniform nomenclature.

2. Hysterical reactions in the Reserve Army.

Oberkriegsarzt (Col., MC.) Prof. BUMKE

We have hospitalized during 4 months from Military District VII, 50 soldiers with the diagnosis war hysteria. The number of mild cases which could be freed of their irregularities by an outpatient treatment is a much greater one. 28, or more than 50% of these hospitalized cases, have had to be considered as not of full intellect. 17 of them had shown psychogenic reactions before their enlistment in the Army, such as trembling or similar disturbances. 8 of them were said to have been under medical treatment for nervous disorders or to have had a "nervous breakdown". One man has already tried to commit suicide in earlier times. In 7 cases an organic cause behind the psychogenic symptoms was found. In 2 cases which were sent to us, the diagnose hysteria was fundamentally wrong. In 17 of the 50 cases it has been possible to establish that the trembling or other psychogenic symptoms have probably been the consequence of a fright.

How can war hysteria be avoided? Most surely, if at all possible, by not enlisting unfit people. But if a psychopath has been enlisted and then shows hysterical symptoms, he is not to be discharged again under any conditions during the war. If therefore the therapy remains completely without success, or in case he has a recurrence after primary successful treatment, there is only one form of further treatment: it is necessary to isolate these people, with the same right and for the same reasons as infectious patients are to be separated from the healthy people. This is done best in special houses of the hospital accommodations in lunatic asylums. The weak-minded may be excepted and may be discharged, if at the same time they are sterilized, for then everybody has notice, that they are not discharged from military service because of their trembling but because of their feeble-mindness.

Discussion:

Stabsarzt (Captain, MC.) Prof. PANSE: In connection with the dissertation of Geheimrat (Privy Councellor) BUMKE, I am satisfied with the remarks about the necessity and success of an energetic treatment of the psychogenic reactions with the aim of their rapid correction in the Mili-

tary District VI. 134 patients with acute psychogenic disturbances have been treated by suggestion combined with strong galvanic currents in the Reserve Military Hospital, ENSEN from 11 March to 11 November 1942. 79% of them were affected with psychogenic paralysis and fixed mental attitudes of immobility after wounds of the extremity, with and without lesions of the nerves, contractures or disturbances of walking. Tremblers have occurred in only 7% until now. The rest were stutterers, mutisms, pseudo-dementias, seizures and similar things. In all cases a relief of the psychogenic conditions was obtained. At the moment they are still more masked, are connected closer to an organic center, are less conditioned on real events, and less demonstrative than 1914/18, but non the less dangerous, as they may be overlooked easier or be mistaken as organic troubles and then may lead to unjustified supposition of decreased or lost fitness for duty. Their number has been increasing steadily for about one year. The treatment by suggestion, combined with strong galvanic currents, does not correspond with the treatment of KAUFMANN particularly as in this case galvanic currents are used and the cure is not possible in one session. After an oral explanation in a kindly and confident manner, and without showing the patient that his attacks are not considered to be serious, in a session of 2 or 3 minutes, (adjustment to 10 to 10.5 of the regulation switch of the pantostat, corresponding to 80 to 100 milliamperes resistance) a treatment with the rolling cylinder electrode is performed. Hereby the heart remains as far as possible outside of the course of the current. Between 1 to 2, at most 3 applications of current followed immediately by movement exercises which are adapted to the condition. At the beginning even insignificant results are sufficient; the further suggestive and exercise therapy is to be developed upon them. In obstinate cases repetition of the treatment from time to time at 7 day intervals is used. But in most cases a single treatment is enough. Every injury of the sense of honor of the soldiers is avoided. The patients must have the feeling they are being treated with a particularly efficient method, but not threatened by a current treatment for the purpose of giving up the psychogenic mechanisms. In my opinion such a treatment is not dispensable, as there is no other treatment, non-injurious to health, with the same impressive and suggestive power. The treatment is to be done by neurologists and psychiatrists who are certain in diagnosis and with good experience. Under this supposition it has already proved good in the field. In single cases we have received notice of recurrences.

Directions for the evaluation of soldiers with mental-nervous irregularities ("psychopaths") and mental-nervous reactions.

A. General.

The so-called hysterical reactions, represented by simple psychogenic superpositions and hyperaccentuation and including the presentations of apparent irregularities such as trembling and shaking are to be distinguished for the beginning from those abnormal reactions, which occur after an overload and from such ones, which have to be considered as the expression of a psychopathic predisposition.

Furthermore we must not forget that there is a diminished resistance of the youngest and oldest ages; of the youngest because of their immaturity, of the oldest because of their exhaustion. If they react in an abnormal way we have by no means to suppose in every case that there is a psychopathic personality. That means for the evaluation of the juveniles that we can give them, in most cases, a favorable diagnosis, whereas it will be unfavorable for the older group. The young are to be gradually brought back to front service, whilst the older patients are to be withdrawn from the front and employed according to their capacities.

On the other hand, abnormal reactions shown by middle aged soldiers are to be considered in most cases as the expressions of an irregular predisposition. Their antecedents (previous history of their family, period of sojourn in an asylum and previous convictions) are to be clarified and an education program is to be tried after curing the symptoms.

All psychotherapeutic measures are to be started only after the most exact examinations with regard to organic changes. Soldiers who for example complain about disturbances of stomach, intestines, circulation, or bladder belong to the internist. The neurologist is consulted in these cases at the beginning only in case of necessity. On the other hand, one should insist upon the consultation of a neurologist as early as possible for these wounded soldiers, who have to lie at the beginning in a military hospital where no neurologist is available. Thus it is possible to avoid various accommodation or defense attitudes.

The treatment of psychogenic troubles has to begin as early as possible. The milder reactions usually disappear quickly by themselves or by means of cameraderie. Some of them need medical treatment as early as possible. If after several days no involution has occurred, transfer to the neurological department of a field hospital becomes necessary. If in this case it is not possible to obtain any results, an energetic treatment is to be instituted as quickly as possible which is still limited to hospitals of the occupied territories and those near the borders of Germany (sub-hospitals). Besides other methods, the treatment with strong galvanic currents has been successful. But it is only to be performed in such a way, that the patient is convinced of its purely medical indications. In any case the impression of a moral influence or even of a punishment is to be avoided.

In many cases the accommodation of organically sick persons on psychiatric closed wards is therapeutically favorable. This measure has proved good in case of psychogenic reactions in which simple psychotherapy has no influence.

The cases, which by every treatment are without lasting success, are - after asking the consultant psychiatrist - to be interned in the sub-hospital of a sanatorium. A war-unfit discharge does not come into question, except in those cases where feeble-mindedness has been diagnosed simultaneously.

In order to prevent the enlistment of such persons liable to military service the writing of a test dictation combined with the first medical examination and classification of recruits is recommended. Attention is to be paid to former diseases, hospitalization, and sojourn in an asylum or nursing home. We give the following directives:

The treatment of the psychogenic reactions has to take place chiefly under the control of the Field Army and hospitals in the rear areas, whilst the treatment of lesions of the central and peripheral nervous system of soldiers of the Field Army is the business of the hospitals in the homeland.

It is the particular duty of the physicians with advanced troops to have an exact knowledge of the different personalities of his unit, and for this a close cooperation with the commanders, also with the lower unit-leaders, is indispensable. Only by this is a just treatment and judgement of soldiers with mental-nervous disturbances possible. A moral judgement as to value based on generalities is to be avoided as among the soldiers there are always obstinate ones and many good natured and tractable ones. In order to make possible a suitable judgement, designations such as "neurosis, psychopathy", "psychopathic reactions" and so on, are to be replaced by a short description of the personality.

B. Special syndromes.

Mental-nervous abnormalities (psychopathy) are disturbances in the sector of the will, the emotions and the instinctive sexual life. They are permanent conditions and of themselves are not diseases, but sometimes they are of so high a degree, that they have the "pathologic value" of a disease (i.e. obsessions). When this is the case they must be classified as "U" in the "Medical Instructions for the Classification of Registrants - with regard to their Fitness for Military Service in Wartime", abbreviated "M.I.C.M.S." (Editor's Note: "U" or "vU" 15.3 is the code for "Serious Mental Abnormality of Pathologic Value i.e. Obsessions, Constitutional Depressions, Phobia"; Folio I Project I Translation of this Section). Practically three large groups may be distinguished.

I. Soldiers with a sound physical and mental constitution.

Abnormal reactions (conditions of anxiety and perplexity, trembling, functional paralysis, etc.) occurring coincidently or suseqent to certain conditions (catastrophic events, exhaustion, secondary or subsequent effects of physical diseases).

Treatment: In case cameraderie and medical encouragement does not help, as will usually be the case, return to a field or base hospital. Establishment of an exact anamnesis as soon as possible. Plenty of food, possibly insulin (10 - 20 units

before the meal) narcotics. After 8 days at the most, ordered back to work and to military exercises. In case of recovery use of service or convalescent home for a short time. In case of failure of the treatment ("hysterical fixation") transfer to the neurological department of a base hospital (see group IIc).

Classification: After removal of the disturbance, fit for active service as previously.

II. Abnormal personalities with pure mental abnormalities.

a. Abnormal characters ("characteropathies") as for instance patients with a feeling of insecurity with an undue sense of self importance, swindlers, asocial and antisocial personalities.

Treatment: Their treatment because of the absence of a mental disease is not medical, but rather a disciplinary matter.

Classification: In case of physical fitness, "k.v." (fit for service) and with regard to above mentioned "M.I.C.M.S." A 15.3 ("Low grade psychological degeneration of a person, who apart from this deficiency will be considered fit for service").

b. Weakness of resistance ("psychasthenics"), i.e. timid people and those weak in forming a resolution who in spite of their best will are not able to act independently because of their helplessness, anxiety and exaggerated feeling of personal responsibility.

Treatment: No particular treatment required other than encouragement.

Classification: According to productive power (i.e. Supply Corps, but by no means construction battalion).

c. Soldiers with the tendency of fixation and production of abnormal reactions ("hysterics").

Symptoms: Coarse trembling, seizures, functional paralysis, loss of voice, deafness etc. Abnormal reactions are partly prolonged (adherence to wish and desire ideas), and in part they are first formed in rear hospitals.

Treatment: Assignment to neurological department of a base hospital. The best thing to do there is to place the patient with cases of brain injuries. In case there are qualified medical specialists available, removal of the symptoms by suggestion hypnosis or galvanic current. After this assignment to a convalescent company. It is better to not undertake treatments of doubtful success among those patients showing symptoms resistent to treatment, but it is better to transfer the patient to the hospital department of a medical establishment of the occupied territories or near the boundaries of Germany. They should not be transported to the home-country, at all events not to their native province. They should not be discharged as war unfit before removal of the symptoms.

Classification: After an unfavorable issue once, one more attempt with earlier employment is justified; in case of repeated recurrences transfer to the hospital department or sub-hospital of a medical nursing and convalenscent establishment.

III. Personalities with combined mental and physical abnormalities.

a. Soldiers with physical defects of the constitution. disturbances of growth, infantilism and retarded development.

Treatment: They should not be assigned tasks beyond their ability. Cases of infantilism should be transferred to replacement units to await more maturity.

Classification: According to mental-physical maturity. Sometimes "g.v.H." (fit for garrison duty at home) and with regard to above mentioned "M.I.C.M.S." L 15 or L 1.2. (Refer to Folio I Project I Translations of this Section).

b. Patients with a labile constitution with tendency to functional disturbances of the separate organic systems (i.e. vasomotor lability, vegetatively labile patients with a tendency to brain edema, spasms, twilight states, tetanoid symptoms after physical exertion, etc.)

Treatment: Stabilizing remedies: Bellergal, Luminal tablets.

Stimulants: Cardiazol, grape-sugar.

Classification: Limited employment (according to L 15, see above) according to their ability.

C. Older soldiers with symptoms of retrogressive metamorphosis caused by age, presclerotic or presenile disturbances (high pressure, irritability, forgetfulness, diminished functional capability etc.).

Treatment: Iodine, Iodine-calcium-diuretine.

Classification: According to above mentioned L 15 or L 49, and "g.v.H." (fit for garrison duty at home) or "a.v." (fit for labor duties only).

C. Principle consideration for transfer to special units.

1. Soldiers of all degrees of fitness with the exception of epileptics and the weak minded may be transferred to special departments or to special field battalions.

2. Special departments are training departments in the replacement areas for the soldiers who learn slowly. If they are unfit because of bad will, they are transferred to the special field battalions.

3. The special field battalion has predominantly the character of punishment. If soldiers are even unfit for them, they are transferred to a concentration camp.

B. Differential diagnosis between schizophrenia and event-reactions.

Schizophrenia and event-reactions.

Oberstabsarzt (Major, MC.) Prof. Kurt SCHNEIDER

At the front diagnosis is often not possible since usually only one examination is done. Inaccuracy is almost to be expected. But sometimes diagnoses could be recognized as erroneous and corrected by the physicians themselves. Drugs transform the picture into a toxic one, an external aggravation of the diagnosis. You then only see an intoxicated or benumbed individual. The difficulties in the case rest on the inadequate preceding history and on certain traits of the symptomatology, which may occur in both cases in the same manner. You rarely are informed if a soldier has had a particularly frightening experience, which could justify an abnormal event-reaction with corresponding contents. Even cases of acute schizophrenia in the field often have fighting and dangers of the front as contents. The difficulty is increased by that. You see the following syndromes: anxious excitement, ceremonius attention or expectation, apathetic stupors, pictures as described by GANSER (GANSER, 1853 - 1931, was a psychiatrist in Dresden, GANSER's syndrome is: amnesia, disturbance of consciousness, hallucinations, generally of hysterical origin: the condition is marked by senseless answers to questions, and by absurd acts. Called also "acute hallucinatory mania".) Even the finding of the single symptoms does not lead to further clarity, as usually they are neither characteristic for schizophrenia nor for event-reactions. Principally only the "symptoms of the first class", which have been repeatedly brought to prominence, are positively decisive for schizophrenia. The frequent occurrence of ill defined psychoses at certain places speaks against a schizophrenia even in a single case. There is no experience about their course in the field. Also in this war, schizophrenia is assumed in too many cases. Concerning the defect, it should be considered, that also after serious events and experiences as well as after diseases a long period of apathy and indecision will occur. These early doubtful cases are by no means all of them transition states between schizophrenia and event-reactions, which should be dismissed without any psychiatric diagnosis. Here it is only the question of a particularly difficult diagnosis. We have to warn against the vague use of "schizophrenia reaction". Either it is the question of abnormal event-reactions or of schizophrenia, which take their contents from their surrounding world, as does every schizophrenia, and in this case the surrounding world is the field situation. We must be skeptical of the first diagnosis even if

it has been established by a prominent physician. This is of practical importance. We have no right to reproach soldiers with event-reactions for even the best soldiers may break in case of great stress of circumstances. They are also criticized by the troops in a remarkably wise way.

Discussion:

ERNST: With regard to the consideration of endogenous psychoses, especially of schizophrenia, we have to observe certain reservations, concerning the Field Army. We have to think of the possibility of symptomatic, exogenous or reactive diseases, above all if preceded by severe mental or physical stress (exhaustion, chilling, insufficient food or lack of sleep) in case there is a physical disturbance or an obviously weak general constitution. During the special conditions of the winter 1941/42 such difficulties could be observed frequently. The clear diagnosis will be facilitated if we succeed in obtaining the preceding history from the troop physician and from the troop (exterior influences and strains, time and form of the first mental symptoms, physical changes, premorbid personality perhaps even behavior at former difficulties of live, family) and are able to study the man (also the reactions to exterior influences, air raids, evacuation of comrades etc.). Evipan-narcosis (in case of psychogenetics sometimes at first combined with "psychocathartic excitement"), Cardiazol convulsions, Insulin-half-shock are able to facilitate diagnosis and to improve the condition enough for eventual evacuation. First of all the establishment of indications is important: evacuation or not? how far? and only then may an exact diagnosis be proposed.

Directions concerning differential diagnosis between schizophrenic mental discurtances and event-reactions in the field.

Because of the similarity of the early symptomatology the cases which do not subside in a few days are to be assigned to a psychiatric department.

We have to recommend that the troop physicians be conservative with the diagnosis "schizophrenia".

As far as the military situation permits the patients are to be left in the base hospital until a clear diagnosis has been established.

On account of the difficulties of establishing an adequate previous history, diagnosis is to be based on the recognition of the acknowledged cardinal symptoms of schizophrenia.

C. Problems of encephalitis.

1. Stabsarzt (Captain, MC.) Prof. Carl SCHNEIDER

At first the lecturer discussed classification and pathological anatomy of the different types of encephalitis. In the moment only the virus-encephalitides, with exception of ECONOMO's encephalitis are important and of these again the panencephalitis of the type St. Louis. The so-called tick-encephalitis "Zecken-Encephalitis") or "Teiga-encephalitis" may become significant. The clinical symptoms were discussed: serious psychic symptoms are always combined with extensive, but constantly changing neurologic symptoms and more serious vegetative syndromes: delirious and amental conditions, numbness, paranoid syndromes, somnolence and coma. Neurological symptoms: transient pyramidal symptoms, cerebellar or olivar disturbances, especially ataxia-bulbar symptoms: trismus, dysarthria, even total inability of speaking, dysphagia. In most cases myoclonus, choreiform and athetoid phenomena, sometimes the "appalic syndrome": stiffness, hypokinesia, reflex of seizing or sucking, irritation caused by external stimuli, listlessness, adynamic speech. The particular symptoms can change from day to day; it is very rare to find the same picture during several days. During this time the general condition always remains considerably affected as is shown especially by the conduct of the vegetative functions: marked perspiration, pronounced lability of pulse and of blood pressure, collapses, excess salivation, bloated face, dry skin. Bulbar-vestibular forms: apoplectic forms, pronounced dizziness, usually without any precursors and nausea often forces the patient to complete tranquillity. Besides that nystagmus, difficulties of equilibrium, Romberg's syndrome, deficiencies of cranial nerves (paresis of facialis and abducens), bulbar deficiencies of sensitivity. There also occurs thalamar and diencephalic pictures, as well as atypical ones: polyradiculitis or polyneuritis, Landry's paralysis, psychoses, only after subsidence of the neurologic syndromes and masked forms, grippal and subchronic and chronic neurasthenia-like conditions of feebleness. There is to be found also a slight change of character in the direction of anxiety, fearfulness, whining, pictures of the type of psychic-emotional conditions of feebleness after symptomatic psychoses. Added to that brisk vegetative syndromes, sweating, often in a rather profuse manner, emaciation, polyuria, polydipsia, lability of circulation, tendency to collapse, changes of blood pressure combined with minor pareses, mild pyramidal symptoms, altered reflexes, especially those of the abdominal wall, Rossolimo's sign, Mendel-Bechterew's sign etc. Most of these patients were mistaken as psychopaths and draft-dodgers or they were given the diagnosis of vegetative stigmatization. Important for diagnosis are the findings of the spinal fluid and here especially the cell-picture. But the spinal fluid findings are often inconsistent and are often found to be normal. This fact is especially important, but evidently unknown, and therefore diagnosis is often missed. In most cases there exists a pleocytosis, of between some 20 to 30 and some 100 cells, in the first

days leukocytes, later on lymphocytes and plasma-cells. Therapeutically effective are Eubasin, sweating procedures, supply of sufficient fluids, irradiations with X-rays, frequent blood transfusions, high protein enemas at intervals of about 5 days and grape-sugar intravenously.

Point of view of the Consultants' Committee regarding problems of encephalitis.

Until now the observations are not yet sufficient for the establishment of new directives. It is certain, that besides the known types of inflammations of the peripheral and central nervous system which have been observed before the present war there were disease-pictures in Japan, America and with us (which were designed as encephalitis japonica and St. Louis) and also the so-called tick encephalitis should be mentioned in this connection. Etiologically these diseases are not yet sufficiently clear. In consequence, a special treatment cannot yet be recommended. This is especially true for the non-suppurative forms, some of which are said to not even show inflammatory changes in the spinal fluid. In cases of the suppurative brain diseases one should use sulfonamides, especially Eubasin, Cibazol, Eleudrin, Globucid etc. According to the present situation it is urgently necessary to carefully consider at the next meeting the problems concerning primary inflammatory diseases of the brain, spinal cord and of the peripheral nerves, as well as those subsequent to infections, either general or focal. The consultant psychiatrists have already been collecting material and have referred to the need of further work on this problem.

D. Causalgia.

1. Oberstarzt (Colonel, MC.) Prof. WUTH

Causalgia, known ever since the American Civil War, but in peace-time often forgotten in spite of the reports of several researchers, appeared in World War I and now again in this one. It is not to be mistaken with neuritis. Its symptom picture (burning pains after dry touch, even following noises, even in the uninvolved extremity) must become better known in order to avoid confusion with hysterical reactions and thus result in wrong and possibly unjust treatment of the patients.

2. Oberfeldarzt (Lt. Col., MC.) FUCHS

Among 13 gunshot injuries of the extremities, with and without peripheral nerve injury, the following syndrome was observed: 1. "Indefinable" continuous pains, not influenced by analgesics. The pain distribution chiefly involves the palm of the hand or respectively the sole of the foot of the injured extremity. 2. Increase of the pain due to movements of extremities which may be distant from the injury. Attacks of pain in case of concussions. 3. Algogenic and algophobic akinesis, as well as fear of concussions. Expectation-anxiety, even if you come near to the bed. 4. Pain attacks of protopathic character caused by tactile and thermal stimuli in the painzone, in rare cases also pain in the symmetrical part of the uninjured extremity (alloparalgia). 5. Synesthesialgia (that means a condition in which a stimulus produces pain on the affected side but no sensation or even a pleasant one on the normal side of the body) tactile and thermic stimuli on any part of the body may cause pain in the affected area. 6. Pain attacks by sensory stimuli as for instance glaring light, but especially noise, tumult. 7. Xerosalgia, better called trachyalgia, that means provoking pains by the feeling of dryness, of rough material, by touching or by being touched with dry fingers, by the weight of the bed linen, by putting on rough socks, by touching paper, - all these may cause pain in the affected area. 8. Hygromania, that means moistening the painful extremities, as well as parts of the skin far away from the wound. Such patients wear moist bandages on hands and feet, they moisten their fingers with a wet sponge for preventing xerosalgia. The same is attained by oiling the hands and feet, and wearing rubber gloves. Phobia to all dry and rough material. Patients are not able to watch other people put on rough socks, or scrub their hands. 9. Sympsychalgia, that means transposing psychic occurrences into pain attacks in the injured zone. Even the thinking of grief and joy starts pains. 10. All 13 cases were healed abruptly by removing the stellate ganglion and thoracic ganglions I and II, or by the removal of the lumbar ganglion II and the sacral ganglion II with their attached sympathetic nerves. The operation was done by Oberstabsarzt (Major, MC.) Dr. Hans LEHMANN, Vienna. The oldest cases have been free from pains for 3 years.

It is to be requested that the diagnosis causalgia be used only for a well defined syndrome. About the therapy and the mechanism of this disease, no agreement was possible. Burning pains caused by traumatic neuritis, neuralgia, and phantom pains by sympathectomy, cannot be cured.

The grotesque behavior of the causalgia patients and their phobias occasionally causes their being mistaken as hysterics. But after the operation these patients bear the burning pains with the greatest tranquillity of mind, behave neither hysterically, "neurotically", nor as "pain-hyperpathics", whenever contractures and stiffness which have arisen during the disease are freed.

Indications for operation: As soon as the diagnosis is firmly established and the patients themselves feel their condition is intolerable. Otherwise there is danger of morphinism and in case of neurologic failures irreparable contractures and atrophies.

In case of the 13 patients referred to neither the removal of the projectile of a shell splinter, nor exterior and interior neurolysis, epidural injections, vitamin B, vaccineurine, cobratoxine, vaso-dilatoric remedies, insulin, galvanization and short waves were able to cure or to stop its further progress.

As a result of the Vienna experience it is not pertinent that the relative deficiency of vitamin B caused by war nutrition is the cause of causalgia, as has been supposed. For, 8 of the 13 cases have been wounded in the time from 1 to 21 September 1939 and were affected within a few days and weeks with a completely developed causalgia. A relative vitamin B deficiency cannot be assumed during this period.

3. Stabsarzt (Captain, MC.) Prof. Carl SCHNEIDER

After having eliminated all neurological contractures and those caused by surgical operations, there are other persistent psychogenic contractures and curious forms, which evidently are related to causalgia. Their symptoms are: curious distorted cramped position, scissors-hand, swan's neck, hands held like dog-paws, prolonged athetoid positions, grotesque stretched and bent contractures. The positions cannot be accomplished by means of the free will. They ordinarily correspond to the type of distribution of the nerves. The tonus is elastic, and pliant. The contracture may even persist during the sleep and in deep narcosis. Symptoms similar to causalgia may be observed. Distinct vegetative phenomena are especially characteristic: serious vasomotor deficiencies, uniform red or cyanotic change of the color of the hand, pronounced cold of the extremities, shiny skin; brittleness, change of color, cessation of growth of the nails; serious deficiencies of sweat secretion, permanent hyperhydrosis, and also increased growth of the hair. Almost always it is the question of partial lesions of the nerves without any abnormal reaction to electric stimulation. In consequence of an interruption of the stellate ganglion relaxation of the contractions takes place.

4. Stabsarzt (Captain, MC.) Dozent ZENKER

The most suitable treatment of the common type of causalgia as well as of the local one consists in the isolated elimination of the sympathetic supply of the injured extremity by way of extirpation or alcoholization of the stellate ganglion and the thoracic ganglion II, or of the lumbar and sacral nerves bundle. In the hospital of KIRSCHNER, 37 patients with causalgia were treated preferentially by alcoholization of the sympathicus, as recommended by PHILIPPIDES, instead of the more energetic sympathectomy. The necessity of an interruption of the sympathetic nerves by novocain as a trial for the clarification of the diagnosis and estimating the prospects of success is emphasized. All patients with causalgia or with causalgia-like symptoms should be brought as early as possible to a hospital department with special experience in this field. A film showing the technique of alcoholization of the sympathicus was demonstrated.

E. Punishable acts associated with drunkness.

Military-medical expert opinion concerning alcoholism.

Oberstabsarzt (Major, MC.) Prof. MUELLER-HESS and Oberstabsarzt (Major, MC.) ROMMENEY

63 cases of punishable acts due to alcoholism have been medically examined since the beginning of the war in the University Institute for Forensic and Criminal Medicine. 17 of these acts occurred at the front and 46 in the home territory. Besides the offences against military discipline and pronounced brutalities there was a striking number of pervert acts (!!). The pervert acts did not take place between soldiers of the same rank, but between superiors and such subordinated soldiers as were assigned to them for special services (personal orderlies, chauffers, etc.). Desertion, the punishable act particular to military service (that is unauthorized absence) occurred in only 3 cases immediately after intoxication. In most cases it was the question of chronic drunkards or of moody creatures and depressed discontented psychopaths, in whom the abnormality of character was the primary cause and the momentary alcohol consumption only the cooperating cause. Among them most were found to be previous offenders (the group of lesser value and the morally deficient). While in some cases cooperation of alcohol could be excluded on the whole, in the majority of the cases, a more or less severe influence of alcohol was to be observed (giddiness to complete drunkenness). But the real intoxication states were equally frequent (simple drunkenness or complete drunkenness and abnormal or pathological intoxication - the so-called "p.R." which means "pathologischer Rausch"). Among the cases of complete drunkenness acts of subordination, brutality and pervert acts were of the same frequency. In cases of pathological drunkenness brutalities were predominant. Only in

3 cases was congenital or acquired injury (psychopathy, chronic dipsomania, trauma of the brain) established as the basis of a pathological drunkenness. Far more frequent were abnormal alcoholic reactions derived from exogeneous causes, (i.e. physical overstrain or exhaustion, overwhelming emotional events, as well as unaccustomed or unfit sorts of alcohols which were unfit for drinking purposes such as selfmade brandies etc.) in cases of otherwise physically and mentally healthy persons and even in soldiers of much value.

Since the abolition of paragraph 151 of the "MStGB" (military penal code) intoxication by drunkenness during and out of service is subject to disciplinary (company) punishment, whenever no punishable action has occurred or in certain cases (i.e. motor-car-accidents) no essential harm has been done. The soldier is warned against the use of alcohol by pertinent orders and laws (paragraphs 49,2 and 141 of the military penal code), which point out the dangers of excessive consumption of alcohol as well as by the instruction leaflet: War and Alcohol. Therefore every soldier acts carelessly according to the opinion of the General Court Martial of the Reich, who intoxicates himself. Maintenance of discipline requires the enlargement of this idea of carelessness as much as possible. Paragraph 330a of the penal code will not be applied as a rule, only in case a pathologic intoxication occurs for the first time. But also in these cases the judge tries to arrive at a punishment by considering thoroughly the general life-experience of the delinquent. Intoxication intentionally caused is punished now, as in former times, according to the principle of the actio libera in causa (an act of the free will) in war times; if occasion arises according to paragraph 5 KSSOV (Undermining the Army). If measures according to paragraph 42a penal code are applicable, a soldier's removal into a hospital but not to an asylum for drunkards is indicated.

Directions for the activity of military medical consultant experts in case of punishable acts due to drunkenness.

I. In a considerable percentage worthy soldiers of previous good reputation may come in conflict with the law in consequence of the particular conditions of service with the Army in war, caused by:

a. physical overstrain, exhaustion,

b. infectious diseases,

c. mental strain in consequence of impressive occurrences at the front or of difficulties of personal or official nature at the front or at home, caused by war conditions,

d. increased impulse to consume alcohol by the influence of comrades or by more frequent access, as for instance in the occupied territories.

II. Abnormal reactions which only the medical expert is able to consider in an objective manner occur relatively often in war in case of acute drunkenness.

III. Cooperation with a medical officer with special knowledge in this field is to be requested repeatedly and urgently in case of the disciplinary and judiciary consideration of punishable acts committed while intoxicated.

IV. In this way it will be possible to consider the subjective aspect of the act caused by acute intoxications appropriately in order to employ the soldiers efficiently at a suitable place by a more detailed consideration of their personality and in spite of acknowledging that they deserve punishment.

V. If the military medical expert is requested to define his attitude regarding the question of carelessness in the sense of paragraph 330a of the Penal Code of the Reich he is obliged to examine this question with particular care considering the interests of discipline.

VI. While the determination of blood alcohol in the clinical evaluation of acute drunkenness will furnish less significant and decisive evidence, on the other hand the same examination, considering the consumed quantity of alcohol, may be very important in case of considering the question of carelessness. Therefore the blood alcohol examination should be performed not only in case of motor-car and airplane accidents but still more often than before in cases of acts concerning brutality, perversion or desertion.

VII. Forensic experience also shows that the pronounced chornic drunkards cannot be kept with the troops in the long run. With the interest of maintenance of discipline it is therefore proposed to continue the education experiments with the troops for not too long a time but to consider the same measures as for psychopaths (i.e. special departments, discharge).

VIII. If measures of safeguarding or correction are considered necessary, transfer to a medical establishment is recommended corresponding to paragraph 42b of Reich Penal Code. The proposal of confinement in a drunkard's asylum corresponding to paragraph 42c is not considered appropriate.

XIV.

PROCEEDINGS OF THE CONSULTANTS' COMMITTEE ON PHARMACOLOGY

Translation prepared by:

Office of Military Government for Germany (U. S.)
Office of Naval Advisor
Medical Section

Pharmacological findings in injuries due to cold
See Section II, Articles 6 - 7

1. Chemical warfare problems.

Oberstabsarzt (Major, MC.) Prof. WIRTH

We have been in war for three years and six months and chemical weapons have so far not been used in practice apart from some insignificant events which are of no practical importance, such as the use of the so-called "Lost*" - mines by the Poles in the area of the Jaslo-Bridge. The conclusion that chemical weapons will not be used at all in this war would be wrong.

* A substance for chemical warfare with the name of its inventors: LOMMEL and STEINKOPF, which is also marked as the so-called "Gelbkreuz" - Yellow Cross - and has the following chemical formula: Cl. $CH_2.CH_2.S.CH_2.CH_2.Cl$ that is Di (Chlorineethyl) sulfide, known commonly as Mustard gas.

All German preventive measures are therefore of great practical importance; above all the organization and introduction of preventive measures and medical precautions against gas-poisoning. In this connection it is important to cooperate in the prevention of such circumstances as are suitable to bring about an unpreparedness in case of gas-attacks: This means the regular maintenance of all gas-masks and gas-blankets, (called "Gasplanen" a piece of canvas soaked with a chemical substance for protection against "Lost" when sprayed from air planes); in addition to this every loss of gas-masks or gas-blankets as well as any inappropriate use has to be avoided carefully.

It must be assumed, that the use of chemical weapons by the enemy will come as a surprise. This is the principle of a decisive success. If preventive measures are not sufficiently prepared, this will cause damage to the individual soldier and possibly serious damage for the public. The cooperation of all medical officers is indispensable in this connection.

Question: Against what agents must we protect ourselves? Which chemical agent is the enemy likely to use? What are the newer medical points of view?

"Lostgroup" (Group of the skin injuring, ground-contaminating chemical agents).

There have been a series of grave injuries by "Lost" in the years 1941/42; e.g.:

1. Destruction of a captured Russian aerial bomb by means of shooting by ordnance sergeants. "Lost" sprayed over neck and back. Immediate decontamination. Death after 9 days, (local skin injuries, death probably by absorption).

2. A man was hit by a spray of "Lost" between gas mask and gas hood. Quick decontamination, severe local injuries of the head, neck and chest. Death after 8 days (death by absorption).

3. Explosion. 34 persons were injured by "Lost", among them 7 cases with fatal result (death after 5 hours, 12 hours up to 10 days). (Cause of death: Absorption with extensive local injuries in some cases.)

4. Injury of 19 men driving on a truck on which Russian "Lost" ammunition had been hauled previously. Skin injuries particularly on the buttocks. 2 men dead after 28 days.

Numerous injuries have occurred under the most different circumstances, e.g. destruction or removal of captured chemical ammunition. Also in these cases the fatal termination is often not explainable by the extent of local injuries but is rather due to injuries by absorption. Even during World War I, HEUBNER, MUNTSCH and SLIKA have pointed to the effect of "Lost" on metabolism. But by far too little attention has been paid to the injuries of the white blood corpuscles by absorption, which may easily be observed and diagnosed clinically. The appearance of an increasing leucopenia is a remarkable symptom, a disease which frequently ends fatally and in which the leukocyte values may be as low as 300 and less. My collaborator DREWS has reported this leucopenia for the first time as observed in cats. According to my own observations at the "Institut fuer Pharmakologie und Wehrtoxikologie der M. A." (Institute for pharmacology and military toxicology of the German military academy) it occurs particularly as a sequel to the influence of higher doses of "Lost" and also of "Nitrogen-Lost" (see below), and less by the influence of arsenical chemical warfare agents. It has been confirmed by LANGE and POSTEL in clinical cases.

The most striking clinical symptom of "Lost" poisoning by absorption is the failure of circulation. I remind you of the fact that in the pathological anatomical picture of "Lost" casualties, SCHUERMANN has found remote effects, especially capillary injuries of the spleen, liver and suprarenal glands, as consequences of a general collapse of the circulation. (A therapy of continuous intravenous drip and blood transfusions has been found to be useful.)

It is estimated that the fatal quantity by absorption of these chemical warfare agents is about 1 - 2 grams. In order that these 1 - 2 grams by absorbed, it is necessary that a considerably higher quantity of chemical warfare agents come in contact with the human body. In general, the absorption of such quantities is possible only by means of a strong spray of chemical warfare agents (immediately near an exploding container with chemical warfare agents or by means of dense vapor emanating from an air plane), but only in the rarest cases when troops are making their way through a contaminated territory; lesions of skin, eyes and lungs occur most frequently under these circumstances.

Even in spite of quickest decontamination of the skin, practical experiences have revealed that "Lost" injuries are not completely avoidable whenever greater quantities of these chemical warfare agents are involved. No efforts should, however, be spared to decontaminate the skin as quickly as possible; clothing will be taken off if contaminated. By this at least it is possible to diminish the degree of the injuries.

Among th prophylactic measures the skin decontaminating agents are of the greatest importance. As is known, the troops are provided with "Losantin" tablets for skin decontamination. ("Losantin" is the name for a special form of a water-soluble chloride of lime, manufactured by I.G.Farben). In spite of their good effect against "Lost" there are the following disadvantages in medication: the necessity of having water available makes difficulties in the preparation of the paste, especially when the tablet has become hard, the determination of the right amount of rubbing this paste upon the skin, the necessity of removing the paste from the skin after exactly 10 minutes, non-applicability of this paste on sensitive skin, or a skin already reddened by the influence of chemical warfare agents.

This situation necessitated the development of a skin decontaminating agent immediately ready for use. In collaboration with Dr. BOESS of my institute, a skin decontaminating-jelly was developed by which the above mentioned disadvantages were eliminated. It is immediately ready for use, the presence of water is not necessary, it may be applied by rubbing in more energetically, it is also applicable on sensitive skin, it is not necessary to wash it off after 10 minutes but may be washed off even after several hours.

This skin decontaminating agent is known as skin decontaminating jelly and is introduced instead of "Losantin". The ointment is taken along in pocket-containers just as the decontaminating agents for weapons. These pocket containers are of a different color and have a different closing mechanism so they may easily be identified. The pocket container is in a protective container, together with cellulose-tampons.

The skin decontaminating jelly is still quite stable at 50° Celsius, it becomes solid at very low temperature, and on thawing it regains its former consistency. At very low temperatures the jelly container should be carried in the trouser pocket. The effect of this agent is similar to that of "Losantin".

If diluted 1:1 with water it is possible to perform also a complete body decontamination with the skin decontaminating jelly, which is hardly possible with "Losantin" paste. It is known that soap solutions have proved satisfactory in body decontamination. Furthermore non-irritating cleaning agents as Satina, Praecutan and especially the MS-soap are suitable for body decontamination. Their principal value lies in the emulsifying and cleansing effect. But as far as "Lost" is concerned these agents have scarcely any greater chemical decontaminating effect than pure water. It is possible to increase the effect by the addition of oxidizing agents.

If an early removal of the uniform and decontamination of the skin has not been possible, it is necessary to perform a complete skin-decontamination even as long as 2 - 3 hours after the contamination, as drops of the chemical agent retained on the uniform might affect the skin even hours afterwards.

The problem of providing a second set of clothes and the organization of the decontamination of the clothes is only briefly mentioned.

The body decontamination is rendered more difficult in a certain manner if viscous, sticky kinds of "Lost" are used, such as have been found several times with our enemies. The performance of the decontaminating measures is described in the revised edition of the "H.Dv. 396, M.Dv. # 318, L.Dv.95". (Army Manual # 396, Navy Manual # 318, Airforce Manual # 95.) On this occasion we should like to call your attention to these kinds of "Losts" containing arsenic compounds e.g. Lewisite (with the chemical formula: Cl.CH: CH.As.Cl_2, Chlorine Ovinylarsine-dichloride). More recently such kinds of "Losts" have been captured again from the enemy e.g. in the territory of the Caucasus. Spraying equipment also found in this territory point to the intention of the enemy to spray these mixtures from air planes especially against living targets. The course of the injuries can be essentially changed by the use of such arsenic containing mixtures. In these cases, even within 1 hour, most serious edema may occur on the affected skin. Decontamination of the skin in the same manner as with common "Lost" is indicated. The same thing is true with regard to the decontamination of the body with soap preparations in case the so-called "Stickstoff-Lost" (Nitrogen-Lost) is used. It is the practically odorless Trichlorine-triethylamine $((Cl.CH_2.CH_2)_3.N)$, an agent which has become known in the last years.

With regard to injuries caused by inhalation and their therapy, we point to the "Vetivazulen" a synthetic, very precious, oil of camomile, which has proved good against injuries due to inhalation of "Lost" or "Nitrogen-Lost". Diluted with liquid paraffine 1:1000, this remedy is inhaled, in a vaporized form by a dry inhaling apparatus.

At the eastern front several Russian medical papers have been captured, which reveal that the Russians have scientifically studied intensively a nettle substance, the Phosgenoxime. This substance is solid in a chemically pure state, but fluid in the impure state, and causes an intensive nettle effect immediately after being dropped on the skin, combined with burning and violent pains, formation of wheals, developing later on into necrosis. We are here in the presence of a skin irritant with an immediate effect, which furthermore has a considerable percutaneous absorptive effect in which the splitting off of hydrocyanic acid-like compounds in the blood play an important role. The decontamination of the skin is particularly difficult, as the effect occurs extraordinarily quickly. According to the experiences made hitherto a skin decontamination is possible only by the immediate use of a 5% solution of caustic ammonia. Decisive in the protection against this weapon is the use of gas-blankets and gas-masks in due time.

In connection with the skin irritant materials yellow phosphorus may be pointed out which is often used in this war as an incendiary agent in different forms.

The principal task for the troops and the physician consists in trying to remove the phosphorus from the skin as completely as possible. For this purpose, first of all the burning phosphorus on the skin has to be extinguished. According to the investigation results of my institute this is performed in a most efficient way by the spreading of oils (paraffinum liquidum, lubricating oils, diesel oil, weapon oils) on the affected spots of the skin. Moreover it has proved very good to clean the wound on the skin with a solution of sodium bicarbonate with addition of a small quantity of hydrogen peroxide. This also causes an excellent alleviation of pain. After the extinction of the burning and the removal of the residual phosphorus as completely as possible from the skin, an ordinary treatment for burns (scalds) will follow.

The phosgene-group has not lost its importance. An old controversial question will be settled by stating that morphine or Eucodal may be given in small doses (0.005) as sedative remedies.

It is known that phosgene and also chlorine in small quantities, shoot out from burning smoke candles. The latter are harmless in the open air, but dangerous in closed rooms. Several accidents have demonstrated this.

In the field of nose and throat irritants, French generators were found in 1940 with a filling of Adamsite, that is: Diphenylamine-arsinechloride: ($HN.(C_6H_4)_2.As.Cl$) which had an extraordinary contaminating effect over a very large area (many kilometers). The only first aid remedy developed until now by the medical services has been the smelling-tube wrapped in fabric with a filling of chloroform-alcohol-ether-ammonia which has been introduced among the troops.

In the beginning we have pointed out the absorptive properties of "Lost". We are under the impression that the agents effective by absorption will play a more important part in chemical warfare of the future than they have in the past.

Hydrocyanic acid as well as chlorinecyanide which are supposed to have been introduced by the Russians as chemical warfare agents, may be cited as examples. The use of hydrocyanic acid in World War I by the French proved to be a failure. Nevertheless we have found with the Russians special plans for the use of hydrocyanic acid according to which it seems probable that this rapidly effective poison may be used as an effective chemical warfare agent. It is astonishing, what extraordinary high protection against hydrocyanic acid is guaranteed by the Russian filter elements in the respirator.

As a further example we mention the arseniuretted hydrogen, which under the effect of the humidity of the air is split off of a granular substance. High concentrations in the terrain are made possible by the use of the product, which in a lingering manner can cause a great effect. In the first place there are injuries of the blood corpuscles (diminishing of the resistence of the erythrocytes, later on hemolysis and anemia). The formation of methemoglobin is observed. A more or less serious state of anoxemia is the result. Hematuria is at first followed by increasing retention of urine finally amounting to complete anuria. To the picture of symptoms of the poisoning by arseniuretted hydrogen belong also vomiting, diarrhea, colic-like pains of the abdomen, injuries of the liver and jaundice. In severe cases death occurs after a long period of unconsciousness, sometimes after convulsions. If arseniuretted hydrogen is used by the enemy in very small quantities a differentiation from epidemic jaundice would be of clinical importance. In these cases the blood picture gives a reliable differential diagnosis, besides the evaluation of the general circumstances. The principal treatment consists in combatting the anoxemia (transfusion of arterial blood, if necessary supply of oxygen) as well as the maintenance of diuresis (copious supply of water, derivatives of purine, i.e. theobromine-sodium-salicylate). Moreover it is important to protect the liver by supplying glucose and insulin, as well as preventing weakness of the circulation by means of analeptic remedies.

Finally our point is discussed which in the further development of the war may become important, namely chemical warfare in hot climates. The opinion is widely spread, that the use of chemical weapons in hot climates is of no use. Just the contrary is the case. It is just the hot climate, which offers ideal condition for the efficient use, particularly of the "Lost" group. This is demonstrated clearly by the experiences of the Italiens during the war in Abyssinia and of the Spaniards in the war against the Rifcabylees. The soldiers wear lighter uniforms in hot countries, they are therefore especially susceptible to spread chemical agents. The warm skin is particularly susceptible to chemical warfare agents. It is imperative to develop at the right time measures of antigas-defense in the hot countries and to include antigas-defense facilities in all medical projects.

Discussion:

GRAWITZ: Points to the urgent necessity of instructing the medical officers so as to avoid all possibilities of surprise in the use of chemical warfare agents.

2. Cooperation of the consultant pharmacologist and the medical officers for chemical warfare problems for the protection against enemy preparations for chemical warfare.

Stabsarzt (Captain, MC.) Prof. GIRNDT

Uninterrupted reconnaissance with regard to the preparations of the enemy and his possibilities for chemical warfare is an urgent requirement, in order to frustrate surprises regarding the possible use of chemical warfare agents by the enemy and to find adequate defensive measures in due time.

Reference is made to reports and personal experiences and it is discussed in which way and with which aim the cooperation of the consulting pharmacologist and the medical officers for problems of chemical warfare should strive for the proper checking of the Soviet Russian preparations for chemical warfare.

It is indispensable that the consulting pharmacologist and the gas medical officer cooperate in the reconnaissance of chemical warfare research institutes and chemical armament factories, this cooperation may even be of the utmost importance under certain circumstances, as it might afford opportunities to investigate the effect of chemical warfare agents. It is hardly possible for officers who are not conversant with toxicological and clinical problems to realize the importance these investigations may have for the appropriate service.

3. New experiences in air-raid defense medical service and the problems of the air-raid warden in case gas is used.

Oberstabsarzt (Major, MC., of the Police) KRAEFFT

The serious air raids on the home front beginning in spring 1942, have required an increased activity of the air-raid medical service, much more than in the past two years. Although the principles of this activity did not essentially change, it has become necessary, more so than formerly, to have a well organized but nevertheless flexible leadership emanating from the leader of the air-raid medical service. As he is overseeing the entire situation at all times, he will have to direct the activity of all air-raid medical units, and he must know exactly, what reserves from other places will be at his disposal.

The formation of emergency squads for the first urgently necessary help, which take care of the evacuation and have the possibility to request necessary reinforcements has proved good. The efficiency of the air-raid medical units is thus guaranteed. A slow removal of rubbish is necessary with regard to the still living people buried under the stones. Burst water- or gaspipes and burning ruins are an aggravating condition.

The air-raid protection rescue posts must also be in a position to admit patients in case of acute diseases and for deliveries. It is the most important task to diagnose the disease as quickly as possible, to judge about the transportability and the possibility for treatment. Only life saving operations will be permitted. Non-medical problems must be kept away from the physician. Persons deprived of their homes should be forwarded at once. The most important types of injuries are trauma and contusions of the body cavities and of the limbs as well as injuries of the eyes. There are also injuries of the eyes caused by vapors which lead to irritations of the conjunctiva, injuries of the epithelium of the cornea and formation of abscesses. Burns of every degree even to carbonisation have occurred increasingly. Tannin together with morphium has proved good.

The most frequent causes of death were: lack of oxygen, suffocation by nitrose and carbon dioxide (CO_2) gases, crushings, piercings through the body cavities and freezings, frost bites.

The guarantee of a sufficient supply of water in case of a breakdown of the water mains and the possibility of refilling water containers by means of fire hoses, the supply of electric current for the use of emergency lamps even in case of a breakdown of the emergency generator and furthermore the uninterrupted function of the emergency ventilation are all essential for the smooth performance of the numerous duties of the air-raid first aid stations. This latter is imperative even if no chemical agents are used, because otherwise the air in the rooms would become intolerable in a very short time by the presence of many people.

There must be available a sufficient number of ambulances especially in case hospitals are hit, or if only their window panes are broken. This means an evacuation of hundreds of patients in the shortest time.

The medical supplies on the whole have always been adequate, the civilians also could be provided with sufficient drugs. To be certain that there is no shortage of beds, auxiliary hospitals must be available.

In case of the use of chemical warfare agents there must be available: gas-sentries, consultant chemists, official physicians and veterinary officers besides the cordon of sentries and protection forces of the police. It is important for the air-raid protection physicians to be able to recognize the type of the chemical warfare agent very quickly so they may perform a proper type of decontamination of the patients. Cooperation with the war gas examination laboratories as well as with the operating decontamination groups must at all times be maintained. On principle everything must be decontaminated that may possibly have been in contact with war gas. It is essential to provide gas-free paths in order to bring the population from the air-raid shelters to a safe district. Besides the gas-masks of the population there are also gas cradles and baby gas-jackets in order to perform a safe transport of all persons.

4. Poisoning in war.

Oberstarzt (Colonel, MC.) Prof. FLURY

It is said, that war does not create new diseases, this statement requires a certain restriction, at least with respect to poisoning. Broadly speaking, the poisonings in war are much the same as in peacetime. But the far reaching changes in all conditions of life and the progressive development of war technique involve more numerous and more diverse dangers. In addition to this, there are completely new dangers to health and life peculiar to the conditions of war.

In case of pathological disturbances or even mysterious cases of death, the physician must also take the presence of chemical agents into consideration. This is of particular importance in wartime. War-toxicology has to study closely every case of chemical injury in the broadest sense of the term. Therefore all chemical materials come into the scope of their activity, even such materials which usually are not considered as poisons, i.e. the host of all chemicals which are used in every day life and in the professions, liable to affect the productive power and efficiency of the soldiers.

Among the poisons carbon monoxide ranges first also in wartime. This poison is especially dangerous in closed rooms, also in the cars of trains and other public means of conveyance, such as ambulances, in airplanes, ships, and in exceptional cases even in the open air. A survey of the great variety of possibilities is hardly feasible. The first symptoms of gas poisoning are of particular importance, that is to say the "mild" cases, which are generally not recognized and which affect the perception, power of judgement, sense of equilibrium and strength of will, thus diminishing production and safety especially under strenuous conditions.

Poisoning by carbon monoxide if seen from the toxicological point of view is the predominant problem as regards motorization. Apart from the exhaust-gases, chiefly consisting of carbon monoxide, there are serious other dangers which, under certain circumstances may prove injurious to health: propellants, gasoline, Diesel-oils, and special substances, i.e. anti-knock-mediums, even the anti-freeze compounds contained in the radiators (glycol, methylalcohol), but not alone the chemicals themselves, also the products of vaporization, transformation, decomposition and combustion.

Lead-tetraethyl and its products of combustion have an important part in these problems. The lead-problems have not yet been solved satisfactorily.

Furthermore an important, but little known chapter of military toxicology comprises all that is understood under the collective term of "oils". The industry uses numerous products which have similar features as oil: lubricating-oils, gliding-oils, cooling-oils, drilling-oils, propellant-oils, burning- and heating-oils, hardening-oils, penetrating-oils and so on. Considering the enormous use and the im-

portance of these products all problems relating to hygienic and toxicological evaluation have not yet been studied closely enough. The Armed Forces also consume enormous quantities of them. In the armament industry these products lead above all to injuries of the skin, the so-called "Oelkraetze" (oil scabies), to the war-oil dermatitis and similar disturbances which have often proved to be hazardous to the worker thus causing losses of production. Also certain flamethrower-oils are irritating to the skin and mucous membranes. Under certain circumstances, i.e. in naval warfare, large quantities of oils are swallowed and serious diseases may occur in consequence, even fatal termination.

It is not the purpose of this lecture to discuss the chemical warfare agents. With the exception of the sensational first cases at Jaslo in Poland, which was instructive in many regards, and the occasional use of irritants and "Lost" containing training ammunition by our adversaries chemical warfare agents have not been used in this war.

In spite of this there have occurred a remarkable number of injuries by war gases. In a great part the victims were civilians, in rare cases personnel of the Armed Forces. The containers with chemical warfare agents left behind by our adversaries in many places in Poland, Russia, the Baltic Countries have been opened and emptied, often in ignorance of their contents and often in an unskilled manner. Thus hundreds of casualties, even a number of fatalities, have occurred. Most often "Lost" was erroneously considered as oil, Kerosin, Carbolineum, motor-fuels and such things and was used accordingly.

The injuries by other chemical warfare agents, above all by smoke producing agents and incendary agents are also numerous. The development of artificial smoke in closed rooms has often led to fatalities. Phosphorus causes combined injuries by burns and cauterization, sometimes also to absorptive poisonings including injuries of the liver. A few cases of injuries caused by chemicals used in flares or other signal material etc., have become known. Poisonings by high explosives are relatively rare at the front, in contrast to their frequency and gravity in the ammunition factories at home.

Also poisonings due to medicinal remedies are not rare. There are in the first place the injuries caused by Salvarsan, by sera and the so-called indicental-effects of remedies, i.e. of the sulfonamides, furthermore the results of a confusion of remedies. Here are to be mentioned especially the erroneous injections of benzine instead of vaccines. This leads to a very severe local tissue necrosis. Carbontetrachloride has caused much mischief, as well as the agents provided for air-raid protection, for the defense against war-gas and decontamination, i.e. chlorine of lime, Losantin, and similar products.

The war-poisonings include many injuries which threaten the soldier in the combat zone and the occupied countries. The numerous modern war-gas dangers are especially encountered in industrial districts, in destroyed industrial plants or in chemical factories. Great quantities of poisons for delousing, disinfestation, and pest-combatting are needed.

Injuries by poisonous snakes, scorpions, and poisonous spiders and other insects, have been observed in the southeast.

Among the poisonings caused by food and similar diseases the following are worthwhile mentioning: the accumulated cases of trichinosis, the mass poisonings by bacteria, poisoning by tinned food (zinc), then the poisonings by mushrooms, by "wild-growing-vegetables", by poisonous berries such as belladonna, crow-berries, etc. Important in these days is the hazard from materials injurious to health which are intended as or used as a substitute for fat, as for instance technical oils, gun-oils, weapon-oils, torpedo-oils. Ortho-tricresyl-phosphate, an odorless and tasteless oil, is probably the most hazardous material of all. It has caused numerous diseases in the Armed Forces and in workmen. The effect is characterized by a typical latent period. Often only after several weeks a sudden motor ataxia and painful polyneuritis appear. Glycol has caused serious, also lethal, poisonings when erroneously used or intended as a substitute for sugar. Furthermore one must consider possible poisonings of water, i.e. by acts of sabotage (arsenic, strychnine, potassium cyanide, corpses of animals). The danger of a subsoil water poisoning may arise from leaky containers of lead-benzine.

The great problems alcohol and tobacco can be mentioned only briefly. Excessive consumption of alcohol has done much mischief in the first years of the war. Also fatal cases due to abuse of alcohol have become known. Numerous are the poisonings by "alcohol substitutes", methylalcohol, carbontetrachloride and similar things such as benzine, alcohol containing and alcohol-like products such as hair and mouth tonics, solid-alcohol, antifreeze agents, lead-tetraethyl, consumed as "strawberry liquor". Not rare are poisonings by "tobacco-substitutes" such as woodruff, golden rain (cytisus laburnum) and other poisonous plants.

Already by this brief review it is shown how extensive, manifold and varied are the tasks of military toxicology. Many chemical injuries remain unclear. This is last but not least due to the fact that there is often no thought of the necessity of a diagnosis, so that the possibility of poisoning is not thought of at all. The diagnosis has the same meaning to the physician as the evaluation of the strategic situation has to the leader of troops. It constitutes the basis for all further questions and problems. Suitable therapeutic measures cannot be instituted nor is an effective performance of measures for prevention and precaution possible without a clear and correct diagnosis. All measures for the prevention of injuries must be based on knowledge and experience, to be disseminated further by appropriate information and instructions. This applies to the chemical dangers and injuries as well as to the military problems.

Discussion:

HEUBNER: Mustard oil causes a serious irritation of the skin only if retained in place by the clothes.

EICHLER: Fatalities and poisonings caused by hydrocyanic acid used for delousing are mentioned. CO_2 (carbondioxide) poisonings caused by cooling waste gas in hot water heaters.

BUSCH: CO_2 poisonings caused by make shift heating devices in automobiles is mentioned.

PLESSER: Poisoning caused by gases of explosions in cases of bomb hits on board ship.

LENDLE: A typical course of poisoning under field conditions, i.e. carbontetrachloride, methylalcohol. It is proposed to introduce the obligation to report cases of poisoning. The same proposal is made by LOESER.

5. Accidents with fire-extinguishers.

Flottenarzt (Captain, MC., Navy) PFLESSER

Accidents with hand fire extinguishers of the Ardex-Tetra type were not infrequently reported. Therefore strict safety measures have been issued especially for extinguishers when used in closed rooms. Nevertheless we still meet with surprises. This is illustrated by the following examples which actually happened in the Navy:

1. Mass poisoning by "Ardexin" in a dockyard: 14 men fell sick, 2 of them to fatal termination when repairing used Ardex fire extinguishers. Course: After a latent period of several hours, suddenly headache developed, giddiness, cyanosis, cramps, after ½ to 2 hours with death in coma and collapse of the circulation. Medical help often comes too late, because of the sudden onset of the poisoning after a latent period which lasts many hours. Postmortem findings: Obstruction in the internal organs, increased content of fluid in the lungs, petechiae in the brain.

2. Repairs on Ardex-fire-extinguishers on board were performed with gas masks. The following night during an air raid when wearing the same masks sudden cramps occurred followed up by unconsciousness and cyanosis. Soon after this death occurred. Postmortem findings: hemorrhagic focal pneumonia. The examination revealed that the active charcoal charged with "Ardexin" vapor is able to free great quantities of vapor, especially when hot air is allowed to circulate through it.

3. By improper use of a Tetra-extinguisher in an A.A. gun post. 3 men dead, 1 seriously injured. Postmortem findings: same as in suffocation. Peripheral weakness of the circulation was observed in the survivors.

4. An "Ardex" extinguisher was demolished during a battle on a cruiser by a 20.3 centimeters hit. 17 cases of poisoning: pains of the eyes with moderate conjunctivitis to loosening of the conjunctiva and formation of abscesses. After ½ - 1 hour pungent feeling in the throat, labored breath and thoracic pains. After a further 1 - 2 hours cough, sometimes with foamy bloody sputum, headache, nausea, sometimes with vomiting and violent pains in the stomach. Besides this after 6 to 9 hours 14 patients exhibited itsching irritations, dark red colored erythemae, moreover in the region of this erythema formation of big blisters. The developed blisters showed great similarity with blisters of "Gelbkreuz" (Lost), as is demonstrated by the pictures. Similar effects are often observed by firemen who get drops of the blocking fluid on their shoes when working at the remote water-level-control device. The skin-active component in all cases has been ethylene bromide. The simple wetting of the skin with ethylen-bromide does not lead to injuries, because of its high volatility. If, however, the clothes are wet, a longer effect is created on the skin, and a penetration into the tissues becomes possible because of the property of this material to dissolve the lipoids of the skin. The described injuries of the skin occur only in these cases according to the experiences hitherto made. "Ardexin" contains besides this substance methylbromide in equal parts which causes the above mentioned injuries of the respiratory system.

6. The pharmacological view-point on drug-therapy.

Oberarzt (1st Lieut., MC.) Prof. KOLL

It is clear that our main interest must be devoted to those conditions which cause the highest rate of losses in troops, such as the wounds and the epidemic infectious diseases. Poisonings hold a special place because as we know from experience they offer difficulties to most surgeons and under certain conditions may occur in great numbers.

The alleviation of severe pain is achieved in almost any case by morphium, Eucodal or SEE, but in the field the narcotic effects of these remedies represent disadvantages under certain circumstances. Therefore it has been attempted to replace the narcotic morphine effects by centrally exciting drugs with the same analgesic properties. Following the experiments in animals, carried through according to the method of KOLL in the Pharmacological Institute in Danzig by order of the Medical Inspectorate of the Army, trials were made with injections of a combination of morphine 0.002 and pervitin 0.0075 in some wounded soldiers. This remedy has so far fully come up to expectation. Often the narcotic effect of the morphine prevails for avout 1 hour, thereafter the patients are awake, alert and active for about 6 hours with a marked freedom from pain. At first only evacuation under unfavorable conditions (sitting or active help by the wounded) was considered as an indication for its use. Further indications are being examined.

Especially in the evacuation of wounded in winter time, this combination might prove satisfactory in order to prevent injuries due to cold, as the wounded do not become apathic under its effect.

According to my observations the local wound treatment with sulfonamides by Marfanil-Prontalbin powder does not take place under conditions which allow these substances to become fully effective (in the majority of the existing technics of application), as the powder usually does not reach all the wound-pockets and is washed out by blood and wound secretions. The small residual remnant is absorbed too quickly. Changes aiming at an increase of concentration and duration of the effect are suggested and will be tested by experiment.

Moreover observations have been communicated concerning the part played by hypo-or anacidity of the stomach in consequence of climatic factors regarding the origin of many enteritides, and about the good prophylactic or curing effect by use of hydrochloric acid or Acidol, (a remedy splitting off hydrochloric acid). Furthermore methylalcohol poisoning was discussed as well as new promising therapeutic experiments regarding this poisoning.

Discussion:

JANSSEN: Considered the combination morphine-pervitin favorably, while EICHHOLZ maintains that there is no need for a combination of morphine-pervitin in addition to the already existing morphine ampouls and pervitin tablets.

RICHTER: Raised the question about accumulative danger by repeated use of pervitin. This question was answered by KOLL in the negative with regard to the special indication.

ZIPF: Pointed out the increased danger of addiction. Morphine-caffein was suggested.

WEESE: Referred to devices for the application of powder for the treatment of wounds with sulfonamides.

JANSSEN: Pointed out to the difficulty of the evaluation of the success.

KONZETT: Discussed the antipyretic effect of sulfonamides.

LOESER: Discussed the treatment of visual disturbances after consumption of methylalcohol with retrobulbar injections of atrapine.

KROEBER: Reported successful results with Acidol-Pepsin in cases of acute enteritis.

7. Problems of medical equipment from the pharmacological aspect.

Stabsarzt (Captain, MC.) Prof. LENDLE

As a result of the inquiries about the drug therapy in field hospitals of the front line medical units, on the occasion of mutual visits with the consulting internist, Prof. SYLLA, proposals were made for the improvement of the assortment of remedies in the set A, C and D of the medical equipment.

XV.

PROCEEDINGS OF THE CONSULTANTS' COMMITTEE ON PHARMACY AND FOOD CHEMISTRY

Translation prepared by:

Office of Military Government for Germany (U. S.)
Office of Naval Advisor
Medical Section

1. Physical and chemical analysis and purification of drinking water.

Oberfeldapotheker (Lt. Col., Pharm. Corps) Dr. GEMEINHARDT

By determining certain substances dissolved in the water the chemical physical analysis indicates if a contamination of the water has occurred. Furthermore it reveals the quantities and the kind of salts dissolved in the water . Poisonous substances which the water may contain or have been brought deliberately into it, may be detected exactly only by chemical analysis. On the basis of the results of the chemical and physical analysis it is possible to issue directives concerning the necessity of a water purification. The troop medical equipment includes devices (field pack-filter apparatus, water purifier etc.) which may be used to sterilize or purify the drinking water. It is also possible to perform makeshift sterilizations or purifications of drinking water by filtering with or without previous addition of precipitating agents of various kinds ($Al_2(SO_4)_3$ - sulfate of aluminum; $Ca(OH)_2$ - calcium hydroxide or slaked lime, etc.) as well as by the carbon suspension procedure. Complete elimination of salt may be obtained only safely by distillation. The use of base acid shifting methods and electric-osmotic devices are for the time being dependent on stationary plants because of the variable composition of the different waters. The elimination of poisons (i.e. chemical warfare agents) is achieved with certainty by a slow filtering through active carbon (principle of the purification filter for water contaminated by chemical agents). The chemical control is not only necessary for all water purification methods but also in case of chlorinating water for the purpose of sterilization.

2. Experiences with the supply of drinking water for the troops.

SS-Untersturmfuehrer (2nd Lieut., Elite Guard) GERSTEIN

The motorized drinking water unit developed by the "Hygienic Institute of the "Waffen-SS" (Combat SS-units) was described. The problem of water purification is to be solved by a combination of several procedures working on different principles, so as to guarantee a safe purification of water which does not respond to our particular system of purification.

Coarse impurities and suspended matter is kept out by a threefold device formed by textures of willow, jute, and fine wire instead of the usual inlet filter basket which is kept afloat in the upper water layers by a float.

The impure water is then conveyed by a pump mounted on a truck through two filters connected in series containing diatomacious earth, active carbon, sodium aluminate and "Caporit" (a chloride of lime with the physical property to disperse readily in powder form) as purifying agents. After passing the second filter the water has normally less than 100 germs per cubic centimeter.

An additional ceramic filter is used only in case of particularly unfavorable water conditions or in case that no purifying agents are available.

The water, after having passed the twin filters, obtained from the filter or the ceramic filter is then conveyed into tanks in which 0.5 grams "Caporit" is added per 500 liters, and after 15 minutes of reaction it is conveyed by a second pump through a carbon filter, whereby excesses of chlorine and musty or muddy smell or tastes are eliminated. The pure water is stored and distributed in heatable tank trucks of 2500 liters capacity, part of which can be transformed by a "Seltomat" installation into a soda water or lemonade. The capacity was 500 bottles per truck and day. The water purification plant is mounted on a 3.5 ton truck and covered with tarpaulins. Its capacity is 25 - 35 cubic meters daily. The quantity of purifying material amounts to 10 - 15 kilograms per 24 hours.

Difficulties which may arise if the water contains slimy algae or other substances are hoped to be overcome by precipitating with milk of lime or caustic lime.

The hitherto gathered experiences with these installations will be published for the general benefit.

The following additional reports were made in line with the objectives of this section of the Consultants' Committee.

Water-supply in North African theater of operation.

Stabsarzt (Captain, MC.) Dr. GOEPFERT

After an introduction about the climatology and the different sources of water in Northern Africa, a survey concerning the employment of the pharmaceutical chemist of the Army is given regarding the organization of water supply for the "North African Armored Army", with particular consideration of the activity of the experts concerned with the discovery and exploitation of new water wells. At the present time an apparatus for water analysis particularly built for use in North Africa for water analysis of the spot is being tried out. Reports about the experiences made with this apparatus and about the activity of the recently formed battalion for water supply with an independent chemist on its staff have not yet been received.

Equipment for chemical water analysis.

Stabsapotheker (Captain, Pharm. Corps) Dr. LEHMANN.

The revision of the water analysis apparatus, of the small box with reagents and of box # 8 of the chemical field laboratory which is subdivided into three boxes was discussed. Further supplements for the detection of chemical warfare agents and for liquid fuel analysis are proposed.

The equipment for water purification.

Oberstabsapotheker (Major, Pharm. Corps) Dr. WILLECKE

Important factors in the development of a portable water purification apparatus for the Field Army are:

1. Efficiency of the apparatus and simplicity of operation.

2. Size of the apparatus.

3. Type of filtration and the problem of supply of the filtration material. The different types of equipment introduced to certain units of the Armed Forces making use of either layers of asbestos, cellulose, active carbon and chlorine or with diatomacious earth, were compared with each other and considered critically. The results of the chemo-bacteriological analysis have proved by now, that the water purification apparatus adopted by the Army, functioning on the principle of filter layers, has not yet been surpassed as to simplicity, capacity, and accuracy in the preparation of completely satisfactory drinking water.

A purification apparatus especially designed for brackish or sea-water was mentioned and the functioning and the employment of these apparatuses demonstrated.

The activity of the chemical laboratories of the Field Army.

Oberapotheker (1st Lieut., Pharm. Corps) Dr. HOFFMANN

The activity of the chemical laboratories, which includes the testing of chemicals, food, poisons, chemical warfare agents, and physiologico-chemical tests, is outlined. The equipment available for this purpose (chemical field laboratory, war-gas protection laboratory, physiologico-chemical analytical equipment) and its possibilities for use were explained. Proposals were made, which were based on the available experience with the view of completing the equipment, particularly that of physiologico-chemical analysis. In addition to the examinations of food and physiologico-chemical examinations, which were done on a particular-

ly grand scale, examinations of captured material, of products of the indigenous industries and the operational control related thereto was described. Special stress is laid upon the analysis of potable water, for the preparation of soda-water, for boilers and for building purposes.

The activity of the chemical stations in occupied and home territories.

Stabsapotheker (Captain, Pharm. Corps) Dr. LINDNER

After a brief outline of the historical development of the chemical equipment of the Armed Forces within the German medical organization which included in its staffs from the very beginning the post of the army pharmacist besides the physician (hygienist). The army pharmacist is particularly qualified in all problems concerning the chemical examination of food, drugs and the very diverse chores of the army pharmacists in army test stations. The various problems in the chemo-analytical field were then discussed in detail. Experiences gained in the routine examination of food, in the examination of chemical warfare agents and the important cooperation as advisors in chemo-technical matters and in many other services of the Armed Forces, were discussed to round out the picture of the important role of the chemical test stations.

Examination of food.

Oberfeldapotheker (Lt. Col., Pharm. Corps)
Dr. DILLER

It is the principal task of the civilian chemical stations or offices to check on food hazardous to health, falsified, imitated or improperly labelled. In addition to this the analysis stations of the Army have to check on quality, price and the possibility of storing and further supply. With a view to demonstrate how a specific scheme in the appraisal of quality is worked out, the method of checking the quality of "Sauerkraut" was illustrated in detail. Standards will be formulated as soon as possible in the Pharmaceutical Institute of the Army for all kinds of food. In this connection it is urgently required that the chemical analysis stations of the Armed Forces place their experiences at the disposal of the Pharmaceutical Institute of the Army.

Pecularities of the Russian sanitary equipment.

Oberstabsapotheker (Major, Pharm. Corps)
Prof. Dr. UNGERER

Among others the following items were discussed:

1. The chemical heat cushion, the contents of which consist of fillings of technical iron with an addition of either 5% cuprichloride or ammoniumchloride and produces a temperature increasing to 100° C., on moistening it with water. This heat is maintained for several hours. The

thermo-chemical process is explained; it is shown that cupriacetate or cupriphosphate are to be preferred. The danger of inflammability of the heat-cushion containing ammoniumchloride if exposed to humidity was pointed out.

2. Agents for sterilization. Soap "K" is a soft soap, containing 50% Di-xanthogene. Properties and production are discussed, and details given for a quantitative analysis. The details will be published in another place. "Seifensolventpaste" (soap solvent paste) contains 60% benzol II, emulsified with 30% sodium-naphthenate and 10% water to make a jelly. Dust DFA is a dusting powder containing 25% diphenylamine and 75% talcum. Dust SK consists of 10% tetrachlorine-cyclohexane and 90% talcum.

3. In contrast to the German filter for water contaminated with warfare agents, the Russian filter contains an active carbon with 10% colloidal ironoxide in order to bind the arsenic compounds.

4. Water sterilization tablets ("Panthozid") contain 2 - 3 milligrams of active chlorine in the form of an organic sulfone chloramine.

5. Anti-gas packs represent a practical arrangement of skin-decontaminating agents (dichloramine in alcohol or carbon tetrachloride), preventive agents and dressing material.

Details are given by the Institute for Military Pharmacy of the Military Medical Academy.

Winter hazards for medical supplies and preventive measures.

Stabspotheker (Captain, Pharm. Corps) Dr. KOCH; and Oberstabsapotheker (Major, Pharm. Corps) Dr. PREUSS

The following items must be particularly protected against winter hazards:

a. Drugs.

Containers with aqua destillata, blood substitutes, disinfecting agents; ampoules of Novocain (with or without additions), Prontosil, Solvochin, caffein sodium salicylate, Morphine, Cardiazole, Sympatol, Suprarenine, calcium gluconate; sera and vaccination materials, reagents for urine-, water- and chemical warfare agent analyses; emulsions, boroglycerine-lanoline, lubricant media, as well as plasters.

b. Rubber materials.

c. Instruments.

All kinds of instruments for water purification.

A series of proposals in order to prevent hazards to medical supplies was made.

Problems of medical equipment from the pharmaceutical point of view.

Oberstabsapotheker (Major, Pharm. Corps) Dr. UNGER and Oberstabsapotheker (Major, Pharm. Corps) Dr. MAISS

The supply and further development of the field medical equipment is being influenced at present in a decisive manner by the difficulties in the supply of raw materials and by the limited possibilities of manufacture. It is the special task of the pharmaceutical chemist of the Armed Forces, next to the medical officer to cooperate in the perfection of the technical equipment and field medical equipment, as he is supposed to be an expert in all questions concerning raw material and supply, as well as in all problems concerning medicaments, dressing material and applianoes for dressing. All sorts of simplifications and standardizations of the types of technical equipment and of the field medical equipment are to be striven for by all means. In all new developments in the medical field special consideration must be given to the possibility of using the existing items.

XVI.

PROCEEDINGS OF THE CONSULTANTS' COMMITTEE ON FORENSIC MEDICINE

Translation prepared by:

Office of Military Government for Germany (U. S.)
Office of Naval Advisor
Medical Section

Punishable acts associated with drunkenness.
(See Section XIII, Article E)

Ammunition, violating International Law.

Oberfeldarzt (Lt. Col., MC.) Dozent PANNING

The principle will be strictly adhered to that the discovery of the use of dumdum ammunition, regardless of th development of other weapons, will give rise to rigorous retaliations. The evaluation of wounds and projectiles is incumbent on the surgeons. It must be noted that the surgeons (v.BRUNS) have had an eminent part in the development and terminology of the stipulations of the Hague Convention.

The stipulations of the Hague Convention of 1899, article 3, ban "any projectiles which extend or deform readily in the human body, as for instance projectiles with a hard envelope that does not entirely wrap up the inner core or which is provided with slits". The Hague Convention on Continental Warfare of 1907 bans projectiles that cause unnecessarily painful injuries.

These stipulations are not limited to the partly enveloped projectiles mentioned here as an example, but they likewise include the explosive projectiles of the infantry with explosive charge. (Examples: Soviet explosive and incendiary projectiles, British explosive and incendiary projectiles). Furthermore, among others are included - in contrast to the opinion of KIRSCHNER, THOELE, - the massive projectiles, having absolutely the same effect as dumdums, which are similar to the French "balle sectionnee" (sectioned bullet), they extend in the body, producing a large wound, because of their cumulative pressure forming a wedge-shaped, tapering block of tissue-fibres.

The bending and considerable deformation of the lead of the bullet on the partly enveloped projectile cause a very serious and large wound.

In each single case it is difficult to ascertain the demarcations of the wounds, caused by percussion shells and in case of riochetes or serious bone damage. The formation of lead contaminated cavities, as described by PERTHES, may also be caused by explosive ammunition. The fissures at the spot where the dumdum entered as described by v. BRUNS, are probably due to the decomposition of the anatomic preparations. According to recent experiments carried out by THOELE and by myself and according to hunting experiences with partly enveloped projectiles a ragged wound of entry is not observed.

The wedge-shaped widening of the woundbed in case of a small wound of entry possibly a bit larger than the missile, as well as certain findings about injuries due to projectiles lodging in the body are characteristic.

The findings about the wound of themselves are never solely conclusive.

The so-called "Mantelspinne" (spider-shaped casing) a remnant of the bullet envelope, which THOELE considers as convincing evidence of dumdum and which is characterized by an intact or almost intact base and outwardly bent longitudinal shreds, may however originate also from intact pointed bullects. This was proven by my own experiments by intercepting bullets including all fragments in sawdust. Contrary to THOELE's conception, a repercussive movement of the lead-core, caused by the counter-pressure of the resistance of the target, and thereby damaging the base of the bullet, does not take place. On the contrary the specifically heavier lead will protrude at the impact. A defective point of the bullet may cause the protrusion of the lead and show the same effect as the partly enveloped projectile, tearing up the envelope in the shape of a spider.

The use of dumdum may only be ascertained positively either if the findings of the wound confirm it, or if the spider-shaped envelope reveals no traces of a previous impact that could have caused a damage of the bullet point.

Examples of such projectiles, being damaged before hitting the body, were then shown, as for instance the rear fragment of a French groove-bullet (type: [illegible]32.) that was broken at the fastening groove and deformed towards the spider-shaped envelope, as well as a Soviet S-bullet (ordinary pointed S.A.A.), bent by a secondary part of the projectile, to the shape of a mushroom which was overlapped by a front shred of the envelope. Furthermore a Soviet tracer projectile was presented which showed characteristic deformation in that the shell body containing the tracer substance took the shape of a mushroom and the shape of a spider; sharp contours revealed an impact on a hard intermediate target. The special design of these Soviet 8m star shell tracers excludes their possible use as partly enveloped projectile. (no lead at rear of the projectile). Then a spidershaped envelope of a Soviet S-bullet was presented, which had undergone a deformation owing to a previous impact as was shown by the presence of cloth fibres under the bent envelope.

Finally some rare findings about bullets lodged in the body could be presented bearing clear cut evidence of the use of dumdum, namely parts of bullets extracted from the body, with clearly recognizable edges of the pointed hole of partly enveloped bullets, according to the characteristics as established by KIRSCHNER. These conditions especially prevailed in one case, concerning a fragment of a French hollow, pointed bullet, called "balle de stand", meaning a rifle range bullet which is used, according to v.BUTLAR-ELBERBERG, by the French for executions because of its intense impact. In an experiment on animals it could be demonstrated how a frontal edge fragment of an English double-core bullet (Mk VII with aluminum in front and lead-core behind) had been broken off by the mechanism, existing on the English Lee-Enfield rifle, the so-called lever-hole of the retaining spring of the magazine. Herefrom, characteristic notches are often formed next to the fracture margin.

The following discussions were also held by this group of the Consultants' Committee:

Self-inflicted mutilation by gunshot and other mechanical influence.

Oberstabsarzt (Major, MC.) Professor MUELLER

The speaker reported about his own examinations, concerning in particular the problem of the close range gunshot and the proof of close range gunshot by the spots on the skin where the bullet entered by microscopic examination and micro-chemical examination with the dithizon-reaction. Besides the dithizon-reaction intra-red photography of the clothing and equipment is recommended which, however, does not furnish any clues if the clothing is fully soaked with blood. It is not valid on the boots. The dithazon-reaction is always reliable. A soaking of textiles with leaded gasoline does not result in any important increase of the precipitation amount in the dithizon-reaction.

The effects of the tracer ammunition have been under study. No special features have been observed in case of normal penetration of the projectile. In case of gunshots with tarnished projectiles, lodging in the body, the wound-channel appears granulated by black masses and burn cavities are formed. We furthermore observed amorphous foreign substances and globules of coagulated protein. A slight dithizon-reaction is found within the burned area. Magnesium is traceable.

Discussion:

PLANNING: The smoke of the Soviet tracer projectiles (see leaftlet) contains barium, which being an element that does not occur in the human body, can always be ascertained by spectrographic examination in spite of powder smoke. The same is true with regard to strontium contained in the ammunition of the Western Forces. The lead, proven by dithizon, which is effective in the smoke of tracer ammunition, originates from the lead-coating of the case of the tracer substance. Magnesium also is a constituent part of the tracer substance, but spectrographically is of no use, as it occurs normally in the human body.

The organization of the forensic-medical service in the theater of operations.

Oberfeldarzt (Lt. Col., MC.) Dozent PLANNING

Notification of the plan of operation.

Experiences concenning forensic-medical service in front-lines.

Stabsarzt (Captain, MC.) Prof. BUHTZ and
Stabsarzt (Captain, MC.) Prof. SCHNEIDER

Both point out the necessity that information concerning the tasks of the Consulting Forensic-Physician should be addressed to all commands, particularly to the General Court Martial (Ic). Sufficient transportation should be made available; trucks will be best for Eastern conditions.

Organization of the forensic-medical service in the homeland.

Oberfeldarzt (Lt. Col., MC.) Dozent PLANNING

The text of a formal agreement with experts of forensic medicine about extrajudicial autopsies for the Armed Forces and concerning the appointment of experts by the judicial department of the German Army for forensic sections to the subordinate tribunals under the authority of the German Army.

The forensic-medical investigation on Soviet violations of International Law.

Stabsarzt (Captain, MC.) Prof. Dr. BUHTZ

115 exhumations and autopsies have been made from 28 August to 21 October 1941, along with thorough examination of eye-witnesses and troop physicians about Russian violations of International Law. In numerous cases torture of German soldiers of the Army and the Airforce, who had been taken prisoners of war, wounded or not, was undoubtedly proven, in particular rifle stock-hits and numerous stab marks on soldiers, gunshots that did not originate in combat but from torture and murder, a combination of bayonet-stabbing, hitting and close shots on defenseless prisoners, proved by the course of the bullet through the trunk and arm, gunshots into the eyes or into the mouth opened crying for help, gunshots into prison-cells, furthermore shooting in the neck, while standing with hands up, clearly prove the deliberate violation of International Law. Acts of particular brutality, such as injuries of the genitals, stabbing or shooting into the eyes, spiteful fettering, furthermore tortures by repeated stabbing or hitting, shooting and stabbing on one and the same person were found. The violations of International Law committed on PW's and forcibly landed German airmen are to be considered as the top of brutality. They were frightfully tormented and then murdered. The time and frequent occurrence of brutalities in certain areas as well as the particular type of torture applied, prove that these procedures are carried through systematically and cannot be considered as illegal actions of single subordinate units.

Search of evidence of Soviet violations of International Law.

Dozent SPECHT

These investigations concern in the first place torture-cellars of the NKVD in Baltic States in Russia as well as methods of tortures and arson employed by the Soviets and on the other hand to the terrifying activity of Russian sabotage groups and spies who had been dropped from airplan[illegible] in the rearward areas of the German Army. Hitherto unknown torture-cellars were discovered at Duenaburg. Among other discoveries, scalps were found in the prison-cells at Pleskau which proved in a particularly drastic manner the brutal tendency of the Russians. The limit of brutality in these tortures consisted in tearing off fingernails of prisoners (at Duenaburg). We were able to get hold of the equipment of a group of Partisans dropped at Staraja Russa. The chemical and scientific examination of the sabotage explosive and incendiary material and mines pointed to the important tasks assigned to these Soviet gangs. A complete set of captured sabotage material made it possible to judge the brutal methods which were systematically applied by the enemy. (75 pictures)

The problem of self-inflicted injuries.

Oberfeldarzt (Lt. Col., MC.) Dozent PANNING

We are glad to say that very few instances of self-mutilations have been reported in the German Army whereas the enemy, according to intercepted restricted information intended for the instruction of military forensic examiners, revealed considerably higher figures, namely: increase of the courtmartial of self-mutilators by 90%, between January and May 1942; in some regions the increase went up to 9 times. Absolute figures are available for a certain Soviet Infantry-division (the number was mentioned) which reported more than 50 cases within a very short period of time. In one division 39 self-mutilators were court-martialed in one day.

XVII.

VARIOUS LECTURES IN THE FIELD OF HYGIENE

Translation prepared by:

Office of Military Government for Germany (U. S.)
Office of Naval Advisor
Medical Section

1. Geomorphological analysis as an element of fighting epidemics.

Oberstarzt (Colonel, MC.) Prof. RODENWALDT

Within Chinese culture, geomantic ideas have been expressed for thousands of years in order to determine propitiousness or unpropitiousness of the locality. Their symbol is the Fung-Sohui and the 8 Pat-kwa. In the Greek-Roman culture, too, there was hygienic action based on the strength of geomorphological facts. But even there ideas of magic were predominant, such as we find in the measures taken against malaria epidemics at Selinunt by Empedokles.

Modern epidemiology must consider the multiformity of the causes, so it is obligated to solve the problems of why epidemics are often dependent on a certain behavior of the soil, why they proceed in a certain direction and sometimes in strange ways. An important task, which is being worked on at present, is the cartographical survey of epidemic spreading. The object of this work is to completely discover the various causes of these epidemics. In this work, one cannot do without an analysis of the soil, of its statics and dynamics.

Examples for epidemic conditions requiring an explanation are the limitation of paratyph[illegible] B to the temperate climate, of paratyphoid A to countries with warm climates, of paratyphoid C to the Near East, the regional dependence of hepatitis epidemica, the irregular distribution of tetanus and gas gangrene infections.

The lecture includes the method of geomorphological analysis as demonstrated by the example of malaria.

This analysis is simple if malaria caused by human work is concerned, such as the creation of artificial breeding places for the anopheles by inappropriate work on cultural structures (construction of railroads, dams, etc.). In order to avoid such mistakes, hygienists must be in close cooperation with the technicians. Analysis of natural situations with the aim of finding out whether they are alterable or inalterable is discussed in the example of coast-malaria, and that in its dependence on the situation created by the so-called displacement of the coast. By cooperation of surf and drift, the sea shifts every particle of sand and thus the whole sand-mass of the coast in the direction of the drift. If surf and drift are stronger than the impetus of the rivers running down from the land, these are shifted along the coast in the form of lagoons and their mouths are closed permanently or temporarily. - Deforestation of the mountains causes the sharp contrast at the heads of the rivers, large floods and later almost completely running dry. This is the fault of man, too. These situations are illustrated by numerous examples from the coast of East Prussia (Haffs - fresh water lakes) and from the tropical zones (Dutch India). Pictures of Crete demonstrate the mechanism of coast-displacement. By aid of them, the possibility or impossibility of effecting a change by keeping the river-mouth open was discussed.

Examples from Crete and Greece were demonstrated in pictures, in which some success was obtained, and in part of which there was no possibility of changing the dangerous situation. Two of these examples concern situations known from the Herakles myth, the Lernaean and Stymphalic swamp of the Peloponnes, which the lecturer was in a position to analyse some months ago. Finally, it was shown by the example of the Seraju-delta, a region of Java infested with filaria malayi and elephantiasis, how a complete causality of the epidemics could be established by geomorphological analysis even in a complicated situation.

2. Practical results of predicting epidemics.

SS-Untersturmfuehrer (2nd Lieut., Elite Guard)
Dr. ZIEZOLD

The prediction of epidemics is based on the experience that the spreading of an infectious disease is a natural process with its own laws. If these laws are sufficiently well known, fairly precise predictions can be established even in advance as to the probable development of the epidemics in the subsequent period.

1. Epidemic waves recur every year at the same time. The number of patients first affected by meningitis will rise particularly high in April. Cases of typhoid fever will be most frequent in the beginning of September, cases of poliomyelitis in the middle of September. As a rule, the peak of the scarlet fever wave will be reached at the end of October, of diphtheria at the end of November. These times will be regular with a limit of 2 - 3 weeks, in case of meningitis 4 weeks.

2. Also the amplitudes, that is the height of the annual waves, are remarkably constant. At the period of the highest morbidity, there are regularly twice as many cases of scarlet fever as in the less active season. With diphtheria, the numbers of cases rise every year at the time of its peak to 2 - 2½ times as much, with paratyphoid to 6 - 10 times, with poliomyelitis to 10 - 20 times the lowest level.

3. As for the inner structure of the epidemic waves, we know the following: All intermediate states between maximum and minimum of the epidemic waves are related to each other according to natural laws. The number of fresh cases depends on the number of the immediately preceding fresh cases and on another factor fluctuating like a sinus-curve. The logarithms of the sick rate, therefore, practically follow a sinus-curve.

4. Besides the seasonal waves, the "season-rhythms" of the epidemics, even a regular rhythm of several years can be observed with some infectious diseases. With typhoid, we are at present again on the ascending phase of a wave of about thirty years. With diphtheria, the peak of a wave of also about thirty years will soon be arrived at. The number of scarlet fever cases fluctuated in a rhythm of about 8 years till 1936; at the end of 1940, a new wave set in, which is shorter and whose peak has evidently been passed in the spring of 1942.

These four regularities of the course of epidemic diseases are so pronounced that they can be made the basis of a prediction. With them, one can predict the probable course of the epidemic waves normally to be expected. This is the course occurring if the regularities observed previously continue. Deviations of the prediction at once indicate extraordinary tendencies, so they are no less important than a really correct prediction. Thus, the prediction provides a normal measure of the quantitative judgement of epidemiological reports. In a systematic observation of the causes of these deviations even more valuable knowledge of the causalities of the epidemic course might be revealed. On the other hand, every progress in recognition of the causalities will render the perfection of the epidemic prediction possible. Examples illustrated by slides were shown, on the one hand for the regularities of the epidemic waves and on the other hand for characteristic deviations from the normal course. The subject of "epidemic prediction" is discussed in more detail in a treatise by the author published in 1943 in the Zeitschrift f. Hygiene und Infektionskrankheiten.

3. New bioclimatic apparatuses and experience with them in Southern Russia.

SS-Obersturmfuehrer (1st Lieut., Elite Guard)
Dozent SCHARLAU

The special problems of bioclimatology have led to the development of special bioclimatic measuring units and measuring instruments permitting one to grasp the summary effect of certain climatic elements according to their order of importance. In this field, a detailed discussion of the question was held as to how the coincidental effect of moisture and heat acts on the human organism and how this climatic coupling of factors might be exactly determined by measurements and expressed in figures. In the literature, a series of so-called "curves of sultriness" have been published, which show the difference between a sultry room and a comfortable room. Of the limits of sultriness experimentally and arithmetically deduced, the so-called Lancaster-Castens-curve, also used by RUGE in his work on the problem of sultriness, may be called at present the one which is best justified. This limit of sultriness coincides almost exactly with the vapor-pressure curve of 14.08 mm. Hg. This coincidence can by no means be accidental, but must be regarded as a proof that the regulatory adaption of the human body to the moisture-heat conditions of his climatic environment takes place according to physical laws, i.e. that the feeling of sultriness may be called a function of the vapor-pressure. This results in the possibility of expressing the amount of sultriness in simple figures. If a certain hygrothermic pair of values lies beyond the limit of sultriness, the amount of the feeling of sultriness can be determined either by the extent of the excessive temperature or by the corresponding deviation of the percentage of

the relative humidity. The difference of temperature has turned out to be best suited for that. The difference of temperature may be calculated either by aid of a table or determined graphically; for this purpose, the so-called "hygrothermic curve-picture" has been developed.

The practical application of the difference of temperature led to the construction of a special thermometer, the so-called "thermometer of sultriness". This is an ordinary thermometer with a double scale. On the left half of the scale, there is the usual subdivision in C^{o}, but on the right half of the scale, the limit temperatures are indicated, i.e. the temperatures by which, in case of coupling with the coordinated values of the relative humidity, the limit of sultriness is determined.

The same principle is the basis of the development of a self-recording writer, which delineates the hygrothermic values in continuous curves on a strip of paper. The recording pen is coupled by a special mechanism of transmission with both a hair hygrometer and with a thermometer, and is thus directed by both. This climatologic recorder may be used also for automatic regulation of air-conditionings.

These statements on the measuring-unit and measuring-instruments for the feeling of sultriness have been completed by practical experience from Southern Russia. The hygrothermic measurements made there proved the usefulness of the scale of sultriness and furthermore gave important information concerning the temporal occurrences of periods of sultriness and the regional distribution of zones of sultriness. For this reason, they are, in addition to that, very valuable for fixing the limits of zones of danger caused by the climate.

4. Medical cartography and control of epidemics.

Oberstarzt (Colonel, MC.) Prof. ZEISS

A preliminary condition of work on medical cartography is the knowledge and understanding of the two elements involved, viz. of medical geography and of geographical medicine briefly called geomedicine. For the development of medical geography, which is based on medical topography and goes back to the times of Hippocrates, there are a good many interesting documents, which are unfortunately not yet completely employed for practical and theoretical evaluation for the tasks of modern hygiene. While working cooperatively with the geographer, the geologist, and the cartographer, the hygienist will often be surprised, what concealed or unknown sources are to be found there. The same applies to the medical geography of other countries, in which unevaluated material has often been kept, even for decades.

This fact applies particularly to medical topography, which developed above all in Germany in the course of the 18th century. The Hygienic Institute of Berlin University has prepared for years detailed work on the importance and collection of medical topography.

The Russians based their research work on the classical medical dissertation of K.E.v.BAERS about the Estonians (Dorpat 1814), who followed the German example and did excellent work. They received fresh stimulation by the expansion of Russia towards Central Asia and the Far East. World War I and the decisive importance of the Caucasus in the war with Turkey were particularly important. Numerous quite detailed topographies provided with maps of the Tiflis Army District, which were drafted by Russian medical officers, bear the date of that time. The strategically most important regions of the Caucasus are there described in detail with regard to their military geographical and thus military hygienic importance. According to the sources available to me, the Soviets have continued to draw such topographies with special consideration of malaria in the Caucasus. Considering the inexorable thoroughness, with which they work on all these military affairs, the tables of contents alone promise valuable contributions to the medical topography of the Caucasus in general, and of malaria in particular.

Let us pass to medical geography! It is either composed of different medical topographies of single localities or regions, or it comprises the total medical-geographical representation of a country, of continents, or of the world. Such a medical geography is in most cases a kind of "snapshot of the diseases of a region" of a geographical unit, the single stages of which are represented in various kinds of development, which quite frequently may also involve a healthy region in the vicinity. In all events, border-regions already play a part which can be recognized as an obstacle against an infectious disease or as a medical geographical boundary against an endemic form of disease, according to the circumstances whether traveling or stationary diseases of parasitic or non-parasitic kind are involved.

If we consider the cartographical methods, according to which the individual scientists wished to fix their results and to render them intelligible geographically, we only find extraordinarily primitive conceptions, which do not at all arrive at the methods usual with geographers, nor do they stand a comparison. Both the cartographer and the hygienist have missed the medico-geographical map so far, and there are but slight attempts in the course of a century to create a medical cartography. The development of the idea and method of geomedicine gave a strong impetus to medical cartography. When I suggested that at that time (1931), I demanded geomedical maps and atlases in addition to geomedical methods and a prognosis as one of the principal tasks of geomedicine, which is just as dynamic as geopolitics.

Geomedical research work has two preliminary conditions:

1. Knowledge of geographical facts of the region which is to be examined geomedically, i.e. its boundaries, the shape of its surface and ground conditions, the history of its ground, its earthquake-zones, general climate and special local climatic conditions, community of life and cultural landscape, city landscapes etc.;

2. Knowledge of the medical and medico-historic events in that region.

Thus, geomedicine is that part of medical science that deals with the exploration of spatial and temporal relations of the courses of diseases to processes of the earth.

HAUSHOFER and his school have occupied themselves for years with the theoretical and practical aspects of a dynamic map. They have developed their own methods of representing geopolitical processes and movement; but in addition German geographers have recently engaged in examining the possibility of a "dynamic map" critically and methodically. The difficulties of representation often lie rather in the subject than in the method of its representation. Both, however, cannot be separated, because the processes in time and space must be represented by planes in the dynamic map of geopolitics as well as of geomedicine. There are no difficulties if we wish to represent the present state of extension of a disease in a geographical unit, which has already passed or changes only slowly. Matters are changed if we wish to chart the movement of epidemics. Herein, we have successfully used the method of isodates, which had never been used before.

These geomedical methods are not said to be perfect. Just the opposite. They are only in the beginning of their development, for they allow a good many other valuable combinations, such as inclusion of the density of population, of botanical and zoological geography, particularly of the propagation of animals transferring diseases and their food-areas, furthermore, the immensely important geological condition of the ground. In addition to that, there is the change of the landscape effected by man in times of war and peace and by nature; or the slow origin of shifts of the coast, of swamps, of the rise and fall of the water table, be it caused by man's hand or the hard efforts of nature. All these factors may change a region of health into a region of disease, and thus once more change the map.

For this reason, the medical map becomes a prognostic instrument in the hand of the hygienist, if he reads it with cool brains and practiced criticism. If he does not do so, but tries to read things into the map that do not exist, if he does not consider the bacteriological, diagnostic, and clinical epidemiological facts, he behaves like a fortune-teller, for geomedical methods of the diagnostic and prognostic map must not be used separately but only in closest relation to each other.

5. The sanitary situation in some regions of Africa, as seen from the point of view of the military hygienist.

Flottenarzt (Captain, MC., Navy) Prof. ZSCHUKE

The following report refers to French and Spanish Morocco and to the territories of the African Western Coast from Sierra Leone to the mouth of the Campo-river, a region extending over subtropical and tropical zones, contains deserts, savannas and virgin forests, and shelters inhabitants who vary widely as regards their level of civilization, their standard of living, their manners of nutrition and other factors decisive for health.

If I dare all the same to give a general view of the total situation within a brief lecture, I do so in the hope that personal experience under the present circumstances is of same interest despite all incompleteness, all the more so, because the official reports of the colonial and mandate-governments are sometimes liable to give a false picture of the real situation to people who do not know the local conditions by having viewed them firsthand.

This statement particularly applies to the disease of most immediate practical importance in Africa, malaria, which is of pronounced seasonal character in the north and caused by plasmodium vivax and malariae to a considerable percentage; while it appears in the Central African virgin forest as a most serious hyperendemic permanent malaria with most violent participation of the plasmodium falciparum. Official statistics cannot properly show its eminent importance, since only small numbers of the patients are treated due to the generally insufficient medical treatment, particularly in the regions of the virgin forest, and since only minimal parasitological records will easily deceive and because of the peculiar conditions of immunity among negroes. With the Western African colored men, positive blood-findings may mean a disorder of the equilibrium between the tendency of the parasite to increase and the force of resistance of the body as well as an infection-immunity of a high degree in the nature of a prophylactic premunition (SERGENT), negative blood-findings may mean real freedom from germs of the organism as well as "parasite-immunity" in the nature of a chronic malaria but incompletely suppressed by the body. It is paradoxical, therefore, that both findings in a colored man may speak both for and against the presence of the clinical disease. For a military hygienist, who has only white soldiers to care for, this is of no importance in so far as every carrier of parasites is a source of infection for the gnat and thus, for practical purposes, every negro may be considered dangerous to his white neighbors. Since systematic measures of sanitation in North Western Africa - French Morocco excepted - have been limited to some principal cities and ports, a European military unit is forced to care for their own protection, and that by means of the most conscientious possible realization of medicinal prophylactics, of mechanical protection from gnats and their own measures for control of the gnats. Considerably more of a problem is caring for colored

troops, in which one risks breaking the resistance which is maintained only by continuous reinfection but which is most valuable for efficiency. Generally, one had better wait at first and adapt the extent of control measures to the decrease of efficiency or the number of the cases caused by malaria.

Next to malaria, venereal diseases are observed most frequently. They, too, are not quite covered by statistics, since primitive man, by his most pronounced sense of shame, will refrain from consulting a white doctor for a disease in the urogenital region. With an average of 8%, syphilis holds the second place in the statistics of morbidity, though gonorrhea occurs much more frequently. For this reason the most strict isolation of the European man from colored women is not only a demand of racial hygiene, but also of military hygiene. Ulcus molle, lymphogranuloma inguinale, and even more, granuloma venereum are of no practical importance because of their rarity. Lues, however, has more serious sequelae than in the temperate zone, apart from the missing metasyphilis.

Its sister disease, framboesia, is third in frequency. It has particular foci and it thus is not uniformly distributed. Though its share in morbidity may amount to 21%, it is no hazard to the efficiency of the troops. Europeans will be affected only in exceptional cases - in the Belgian Congo, for instance, there was, in 1938, not one case of framboesia in a European as contrasted to 253,966 medically treated cases in colored men. Colored men old enough to serve in the Army in most cases have only the symptoms and have few spirochetes during the late period, particularly on the soles of the feet, which are effectively treated by Salvarsan and are much less dangerous to the healthy than the raspberry exanthemata of the eruption-period.

After the end of World War I, encephalitis devastated large territories of Western Africa in formidable epidemics; at present, there is the following situation: In the South, particularly in Portugese Angola and Spanish Muni, infection by trypanosomiasis becomes more and more rare, the course milder and milder. The French mandate of Cameroon remained helplessly exposed to the epidemics until 1926 because of the negligence of its government, until the infection-index had increased to 18.7%. The index then dropped to 1.43% in 1932 by energetic control. Since that time, the status quo has been fairly well stabilized. In Upper Guinea, the disease is in progress at some places. In 1936, among almost half a million examinations of the blood, 11% were positive in Nigeria, up to 13% in Haute Volta, and up to 54% in French Guinea. Seen as a whole, the danger threatening from encephalitis is by no means completely removed, but is considerably reduced in comparison to former times by the fact that every case diagnosed in time is certainly cured by Germanin within a few days and that, in addition to this, the prophylactic administration of Germanin will prevent any positive infection by trypanosoma gambiense for three months.

At first sight, the problem of preventing leprosy must appear considerably more difficult, since, for the greater part of Guinea, we must assume an average infection of 2% and have no effective methods neither for treatment nor prevention. In spite of that, troops under medical care are hardly seriously endangered; though we do not know the mode of transfer, we know that transferring will only result in case of close contact with leprous men and in case of a primitive standard of living, i.e. conditions which may be avoided among combat troops. There are additional factors, which are still discussed at present, e.g. foodstuffs containing sapotoxin, such as the tare, colocasia antiquorum, which should be eliminated from the army diet for the sake of security.

The clinical effect of the helminth-infections, too, must not be overestimated despite their enormous frequency, because the infection-intensity only exceptionally corresponds to the infection-index, so that there are many more worm-carriers than worm-patients in Africa. All the same, the military surgeon must constantly keep this group of diseases under control, because there is always the danger of epidemic infection where masses of men are concentrated under unhygienic conditions. Adequate drinking water supply, removal of excrements and garbage and fly-control are urgent requirements of military hygiene in Western Africa as well.

They prevent most effectively infections of the intestinal tract by bacterial agents of the typhoid-paratyphoid-dysentery group and of amebic dysentery which was properly feared so much formerly. This disease is no longer of the nature of an acute epidemic in Lower Guinea; in 1936 its share of total morbidity amounted only to 0.26% in the Cameroon, and in Lages the percentage of positive stool examinations was no higher than 0.5%. This picture changes, however, the farther one goes to the North. Even in Northern Nigeria, the percentage of cyst-carriers increases to 5% and in Morocco serious epidemic courses with the loss of numerous lives are observed every year in the Fall. This is avoidable if the patients are properly treated, but prevention is more difficult and apparently not quite successful so far in the North African campaign.

As regards the diseases publicly dangerous, I refer to the reports, though doubtless incomplete, which have been submitted to the International Health Office during the last two years. According to them, plague is of some importance only in French Morocco, but even there, there are only 3 cases among every 10 000 inhabitants. The decision whether a unit should be systematically protected against plague - the best method is an active immunization with attenuated bacilli - depends on the kind of their engagement and the intensity of their inevitable contact with natives.

As regards yellow fever, the minimal sick rate of the last few years must not induce one to shut one's eyes to the seriousness of the danger. More decisive than morbidity

is the silent infection of the population ascertainable by the protective test, which amounts to 30% and more in Northern Nigeria and French Western Africa among other regions. It can be assumed that jungle yellow fever has spread so much in Western Africa between the 20th degree of Northern and the 10th degree of Southern latitude that outbreaks of epidemics, i.e. yellow fever in towns, must be expected everywhere in case of the importation of non-immunized men. Fortunately, a new French method of immunization with percutaneous and simultaneous application of cerebral mouse-virus and cowpox lymph has proved effective. Corresponding vaccines are being prepared at the Robert Koch Institute and at the Hygienic Institute of the University of Strasbourg.

Typhus in North Africa may appear as the epidemic fever transferred by the clothes louse, the endemic or murine fever transferred by the rat flea and finally the exanthematical fever transferred by the dog tick. There is no cross-immunity; but since the two latter forms take a mild course in most cases, immunization only against classical typhus is to be considered. The increase of morbidity in this year might render such an immunization necessary.

As for the rest, the fighting of rats and their fleas, also because of the plague, the fighting of lice and ticks because of the North and Central African relapsing fever is recommended. The keeping of dogs is contraindicated because they might form a reservoir of the causative agents of Kala Azar.

At last, I wish to mention a disease, the disadvantageous effect of which lowers the efficiency of colonial troops as has been observed also in this war, although little attention has been paid to it: ulcus tropicum. Since etiology is probably not uniform and decidedly is not clear and treatment is disproportionately lengthy, the only remedy available so far is the mechanical protection of the place of predilection, the leg below the knee, by appropriate dressing against injuries and bites of insects, i.e. giving up the fashionable shorts and replacing them by gaiters or wide trousers, fitting snugly at the ankle.

I conclude this list, the incompleteness of which I fully admit, with the statement that the sanitary situation in the North West African area demands the military hygienist's continuous attention and care, but will hardly confront him with emergencies which he cannot overcome with his skill and technical means.

XVIII.

N I G H T - V I S I O N;
P R O B L E M S O F F O R E N S I C M E D I C I N E

Translation prepared by:

Office of Military Government for Germany (U. S.)
Office of Naval Advisor
Medical Section

1. Comparable experiments with different instruments for testing night-vision.

Marineoberassistenzarzt (Lt. j.g., MC., Navy)
F. A. HAMBURGER

Due to the war, especially due to night-warfare, we are confronted with the problem of singling out soldiers afflicted with night-blindness, and on the other hand we have to care for a selection of men possessing excellent night-vision, so they may be trained as night-fighters and night-observers for the Airforce and Navy, or as commanders of searchlight units.

In making the selection, due consideration should be directed to the most important fact, that the acuity of the visual power shifts in a quite unregulated way all over the center and the periphery of the retina, depending on whether it is day or night. By watching that fluctuation in various stages of illumination, varying from 1 stilb (holding the sheet of paper in sunlight) over 10^{-6} stilb (moonlight) to 10^{-9} stilb (complete darkness) it will be noticed that the acuity of vision, as in daylight, remains normal up to 10^{-5} stilb or so, and then decreases rapidly. In the dark-adapted eye there is no region whatever of topmost visual power as in the light-adapted eye; a twilight scotoma develops in the fovea centralis, and at the spot where the highest visual power was located an area spreads around the scotoma annularly, the visual acuity of which varies between 0.02 - 0.1 of normal daylight visual power, depending on the intensity of the illumination of the test object.

It is of much significance in practice that the maximum acuity in night vision is not attained by central fixation as in daylight, but by peripheral fixation. This peripheral fixation does not set in automatically in twilight and darkness but it needs some training. By such training the visual power can be considerably increased. Appropriate methods of training have been worked out in the Airforce as well as in the Navy and are in the course of application.

Decisive as to maximum night-vision is the visual power and the capability of adaptation inherent to the fovea (something about 10^{-5} to 10^{-6}) and to the periphery (usually from 10^{-7} downwards). As to the method of selection the question arose whether these physiologically absolutely separable properties are also quite independent of each other in their distribution in a single pair of eyes, or are they in a close correlation. Should this be the case an examination of one of them ought to be sufficient for an aptitude test.

Until quite recently only one way to test night-vision was available clinically, i.e. by preparing a curve of adaptation to darkness. Yet as this does not take the visual power of the dark-adapted eye into consideration and besides requires as much as a half hour of time towards complete and full adaptation for each subject, it is not suited for our purpose. Very appropriate however is the nyktometer of COMBER, and the device to test night-vision of NOWAK-WETTHAUER.

1. The nyktometer is used to establish a so-called initial adaptation curve; it tests the adaptation and definitive power of the central acuity (vision test at 10^{-6} or so).

2. The night-vision test device is used to determine the peripheral acuity of vision in minimum brightness after full adaptation (intensity of illumination 10^{-9} or so).

Both devices may be advantageously used to examine a great number of people. Device No. 1 takes 10 minutes at the most for examination, which eventually may be reduced to 5 minutes. For device No. 2 the time is 3 minutes for one subject because the span of time of 30 minutes is distributed over all the group of the subjects (30 - 40). Another advantage in comparison to all other methods so far used is, that the results obtained by different apparatus are comparable to a large degree. This applies especially to the second device.

With the aim of finding out any possible correlation, 130 soldiers were subjected to test with both devices. In addition the absolute threshold of perception was tested by means of an adaptometer, taking thereby a variety of aspects into consideration the nature of which cannot be of interest here. The results were:

1. Immediate adaptation and maximum visual power of the fovea are not correlated with the maximum adaptation of the peripheral retina. Accordingly, 4 combinations will be possible, i.e. good visual power of the fovea and good adaptation of the periphery, good visual power of the fovea and poor adaptation of the periphery etc.

2. In order to come to an exact opinion concerning acuity of night-vision an examination with both devices is necessary.

3. As a matter of fact, however, this will most rarely come into consideration, because in only one fourth of all cases, (my results show even lower figures) really unobjectionable night-vision acuity is found. Besides, the test with both devices takes too much time.

4. Rather is it advisable to consider the task the soldier is to be trained for, before making a choice of the device to be used for testing. For instance there are duties requiring nothing else but good peripheral vision in complete darkness (observer on submarines, with no artificial illumination whatever, night observers in the aircraft signal service, commanders of searchlight units etc.), or other tasks requiring quick and comprehensive adaptation of the center of the retina (night-fighters, gunnery personnel, chauffers). For the first group, the NOWAK_WETTHAUER device (2) will come into consideration, and the COMBERG device (1) for the latter.

5. An important factor in practice is the great drawback short-sighted people are afflicted with as to initial adaptation (central acuity) whereas their peripheral night-vision power is usually normal. Therefore short-sighted people are unfit as commanders of searchlight detachments, even in the case of a favorable night-vision test on device No. 2.

Very important additional factors have to be taken into consideration by the oculist, apart from the problem of selection. They concern hygienic measures against the action of light (protective covers to prevent dazzling, the use of adaptation glasses etc.).

Yet still more important is the problem of increasing the visual power. As already mentioned this is a matter of training, it may also be achieved by dietary measures and medicine (Vitamin A, perhaps also toxic drugs such as strychnine).

The English keep their night-observers and night-fighters permanently and fully accustomed to dark adaptation by compelling them to stay in dark rooms or to wear adaptation glasses. As to whether this is right or wrong must still be proved. The process of dark adaptation is a reversible chemical reaction which by the change from brightness to darkness will rather promote night-vision acuity than hamper it. Tests with the nyktometer gave some hints in that direction, exact evidence allowing an evaluation in practice needs still to be furnished.

2. Forensic medical questions.

Oberfeldarzt (Lt. Col., MC.) Prof. GUTZEIT

After inquiring of all the Consultant Internists about the subject and after discussing it with the Internists at the Second Conference, the opinion was expressed almost unanimously that both lymphogranulomatosis and acute leukemia according to their clinical course have to be considered as infectious diseases, the causative agent of which as well as the mode of transmission are not known as yet. For this reason the internists agree on recognizing both diseases as a disability attributable to war service if the first initial symptoms have appeared in war service. The explanation is for one part, that in military service the spread of infectious diseases is much more unchecked than in civil life, due to overcrowded billets and other unhygienic conditions in war service. On the other hand not only the contact with diseased persons plays a part in the spread of diseases, but carriers of bacteria and spreaders may also often be of essential importance. As we do not know the causative agent nor the mode of transmission we might easily come to a false decision unless recognizing it as a disability attributable to war

service in such cases. Taking the general trend in favor of disabled persons, which underlies the Armed Forces Veteran's Welfare and Maintenance Act, into consideration, it would be contradictory to the sense of that law to take any other attitude.

Moreover lymphogranulomatosis and leukemia admittedly may grow worse in war service. Also in peacetime both diseases show an acute sudden turn for the worse if exterior incidents (strain, infection, trauma) have any influence. Considering the marked increase in frequency of manifest and latent infectious diseases in the Armed Forces with simultaneously present physical and psychic strain which the patients are subjected to, it can be taken for certain that this must result in an aggravation of the diseases. Basing non-recognition of disability attributable to war service on the ground that merely an aggravation of the disease has taken place would require in each individual case the furnishing of evidence that aggravating factors were not present.

3. Forensic medical questions.

Oberfeldarzt (Lt. Col., MC.) Prof. LAUCHE

Conferring together with the internists could not be practised for lack of time. As to the question of disability attributable to war service, the pathologists agreed in a special conference, that for the time being leukemia and lymphogranulomatosis should be considered in the same way as infectious diseases having unknown causative agents or unknown mode of transmission (poliomyelitis). It is left to the respective expert to state in his report the deviation of his personal view from the scientific concept (leukemia to be a true tumor). In those cases, however, where the opinion on the nature of the disease is divergent, it shall be controlling in the decision which opinion goes in favor of the subject concerned, or his next of kin.

A N N E X

CONFERENCE OF THE CONSULTANTS COMMITTEE

CONCERNING

PROBLEMS OF MOUNTAIN PHYSIOLOGY

4 - 6 OCTOBER 1942

ST. JOHANN (TYROL)

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FOREWORD

by

Oberfeldarzt (Lt. Col., MC.) Prof. Dr. Dr. LANG

A conference was held concerning the problems of mountain physiology at the Mountain Medical School at St. Johann from 4 to 6 October 1942. It was the object of this conference to acquaint the participants with the results of the research work in this field and to find ways and means for a sensible coordination in the future to avoid that the same problems be undertaken by different headquarters. It is of decisive importance that the scientists of the Airforce and of the Army have seen their way for a close cooperation. As a matter of fact the problems of mountain physiology and aviation medicine have many points in common. The influence of altitude and temperature is of equal importance for both, although the conditions do not fully coincide, since the plane brings the aviator effortlessly to altitudes which mean desperate climbing to the mountaineer. This difference outlines the important problem of mountain physiology, namely to further with all means the efficiency of the mountain troops who are faced with the hazards of altitude and temperature and who have to endure a great amount of physical and mental strength.

1. Sports and circulation.

PARADE (Innsbruck)

The practice of sports and continuous training is a prerequisite for the efficiency of troops in the mountains. The efficiency of the circulation is a very important factor in this connection. Two problems were given special consideration:

1. The direct influence of physical strain on the circulation;

2. The effect of long lasting training on the circulation.

The concentration of physical energy preceding the actual adventure of the body causes nervous regulations which are decisive for adapting the circulation to the prospective exertions. The efficiency, properly speaking, is characterized by sympathicotonia occurring along with a general reduction of the stimulus threshold of the respiratory centers which results in the well-known increase of the circulation. The correlation of these phenomena will be discussed in detail. The importance of the "dead point" which is probably due to a temporary overloading of the blood with lactic and carbonic acids is pointed out. The deficit in the oxygen supply of the body under strain is gradually compensated for at rest. Examinations on well trained sportsmen revealed a prolonged tachycardia in 20% of the individuals as compared with 56% in healthy but untrained persons. The drop in alkali reserves is much more evident in untrained than in trained persons under the same test conditions. This is especially true for the mountaineer. This fact is attributed to the more complete resynthesis of lactic acid in the muscles or reduced formation of lactic acid in trained persons. Long lasting training causes a condition of parasympathicotonia. The trained person is distinguished by a specific economy of the circulation which becomes evident for instance by a reduced pulse rate and pulse volume and respiratory frequency while at rest. The heart of trained persons may remain normal in size or be distinctly enlarged (athletic heart). The intensity of the training is of a certain influence with regard to the enlargement of the heart as is also the predisposition to cardiac enlargement and the regulation of the peripheral circulation. It is common knowledge that the utilization of the oxygen in the muscles - including the heart muscle - is more complete during training and thus increases the oxygen carrying capacity of the blood. The athletic heart is more of an adaptation than a pathologic deformation. The particularly pronounced enlargement of the right heart in some sportsmen is explained by the forcible respiration which is typical in sport. These enlarged athletic hearts owing to their reduced pulsation volume are characterized by small excursions at rest, and they promptly respond to physical strain by large excursions including a large pulse volume. In other terms the enlarged right heart immediately pumps, as from a reservoir, large quantities of blood into

the lungs which proves favorable to the momentary requirements of the circulation. The dominating parasympathetic condition of the sportsmen is of decisive importance for arriving at higher standards of efficiency. The critical heart frequency of 180 - 200 for instance is reached considerably later than in untrained persons. The onset of the critical heart frequency has a particularly unfavorable influence on the coronary blood circulation and will lead to a considerable drop of the pulse volume.

Discussion:

LEHMANN: Each type of work requires an adaptation of the training, even if switching from a heavier to a lighter type.

2. Heart and lack of oxygen.

H. SCHWIEGK (Berlin)

The lack of oxygen is the most frequent and significant variation in the physiology of oxygen breathing animals. It consists of a decrease in the supply of oxygen and an increased consumption of oxygen, two conditions which are both present in case of physical work in the high mountains. The importance of the lack of oxygen for the heart could only be explored about 10 years ago when the electrocardiogram was invented and this permitted the proof of the anoxia of the heart muscle and the secondary changes pertaining to histology. An increased supply of O_2 to the heart becomes necessary either as a consequence of an increased function of the heart or under unchanged working conditions, due to an increased heart frequency, decrease of oxygen supply caused principally by a decreased coronary blood circulation, decrease of O_2 saturation of the arterial blood, and decrease of the amount of hemoglobin of the blood capable of carrying O_2. An extensive regulatory mechanism guarantees the adaptation of the O_2 supply to the actual requirements by physiologic processes, especially by variations of the coronary blood circulation. Excitation of the sympathetics and administration of adrenalin, though dilatating the coronaries, cause a still more important consumption of O_2 by the heart muscle, so that after all the O_2 supply will be unfavorably influenced. Excitation of the vagus nerve and acetylcholin have a conservation effect. This applies, however, only to the physiological conditions and normal coronary vessels. In case of coronary sclerosis adrenalin will only cause an insufficient coronary dilatation, and the vagus excitation may even cause a deletorious decrease of the coronary blood circulation. The lack of O_2 in coronary sclerosis is restricted to the region of the heart muscle. It seems that the heart muscle alone is affected, in the first place by an inadequate supply of O_2 to the heart due to a decrease of the O_2 saturation of the blood and an increase of heart function. Especially the

histologic examinations by BUECHNER, MESSEN, LUFT, have demonstrated, however, that also certain parts of the heart namely the inner surface of the left ventricle, the septum, and the papillaris muscles are especially endangered. This is due to the particular conditions of supply of the vessels and the mechanism of blood circulation in the coronary vessels. This explains that a general lack of O_2 is primarily manifested as a localized O_2 deficiency in certain regions of the heart. The most important aid in diagnosing an anoxia of the heart muscle is the EKG. The S-T segment and T deflection are particularly decisive in this respect. A decrease in the height of the T deflection, isoelectric T, negative T and ST depression, and finally a sudden change to a pointed positive T and a drop of the ST indicate the increasing O_2 deficiency of the heart muscle. The correlation of these changes became clear to a wide extent by an evaluation of the EKG after summation of the monophasic curves according to SCHUETZ. The insufficient supply of O_2 calls forth a change of the form and amplitude of the monophasic curves in the particularly affected regions of the heart. It must be borne in mind that the potential amplitude of the monophasic curves attains a maximum value of about 50 millivolts, that of the summation curves, however, only about 1 millivolt. This explains the large deviations in the standard EKG corresponding to hardly perceptible variations of the monophasic curves in the common recording methods. As SCHUETZ points out, additional monophasic potential variations have to be taken into consideration since the regions of the heart suffering from a lack of O_2 react in the same way as ordinary injuries. The changes of the EKG as described above are not specific for a lack of oxygen and similar observations are made in case of inflammatory heart diseases. These may, however, fit the picture if interpreted either as an impairment of the capillary oxygen diffusion or as a disturbed oxydation process in the changed parts of the ventricular muscles due to inflammation. The changes in the EKG due to an acute lack of O_2 are characterized by transition and reversibility. General clinical reasons make it appear doubtful whether an acute lack of O_2 of the human heart is associated with severe histologic changes (hemorrhages, necroses) as is the case in the heart muscle of the rabbit as was proved by BUECHNER and his associates.

3. Suitability for mountaineering.

BALKE (St. Johann)

Combat assignments in the high mountains will not only require the highest combat efficiency but in addition the best physical conditions and climbing experience of the soldiers. Already the peacetime mountaineer in his climbing tours arrived not infrequently at his last resources of physical and mental energy. So it is quite obvious that the soldier, who has to contend not alone against weather hazards, misanthropic rock and ice and

other difficulties but principally against the enemy, must be carefully selected. War in the mountains is usually waged in small and very small groups. Every man must, therefore, come fully up to the high standard with regard to physical condition and mountain experience. This mountain experience includes quite a host of separate qualifications, such as perfection at climbing, evaluation of weather hazards (rocks, avalanches, sudden fogs and storms etc.) familiarity with the influence of altitude and climbers' disease etc. A well experienced drafting committee and special testing equipment under the direction of a qualified medical officer can under no circumstances be dispensed with in the selection of suitable men. With regard to the physical efficiency the judgement of the medical officer will be of decisive importance, but as to psychological and mental qualities, however, the commanding officer of the respective unit should be heard. The examination of suitability for mountain troops would have to consist of a preliminary recording of the following data: Body height and weight, chest circumference, vital capacity, breath holding test (time breath can be held on deep inspiration). In the main examination the constitutional types, training conditions, and an elaborate anamnesis of the candidates will be established (including achievements in sports, climbing and skiing) in addition to a general and a few special medical examinations bearing particularly on the function of the heart and circulation, high altitude fitness tests, physical energy, and resistance under oxygen deficiency, skill, sense of equilibration, coordination of movements and in connection therewith a courage and perseverance test. As a matter of fact these examinations will have to be carried through at an appropriate place right in the mountains rather than in a doctor's study and it is particularly important that the medical officer supervising these examinations be a mountain specialist himself.

Characteristics of high-mountain fitness.

1. Physical and functional properties: athletic-asthenic constitution, well trained, large respiratory volumes, perfect function of the heart and circulation with typical labor or athletic heart, possibly typical athletic bradycardia; good coordination of movements, perfected sense of equilibration, skill, and perseverance.

2. Mental qualities: Interest in the mountains, practical and theoretical experience in mountain climbing, knowledge of important alpin literature, avalanches, meteorology, sense of orientation, capability to assume responsibility for all kinds of climbing tours, correct evaluation of difficulties and possibilities.

3. Psychological features: Enthusiasm for the mountains, mental energy, will power, courage, calmness, ability to make decisions, sense of responsibility, sobriety and hardness in the endurance of adverse weather conditions.

Discussion:

OPITZ: The additional stress on the respiration in the high mountains makes a high vital capacity very desirable.

ANTHONY: In the Airforce the judgement of the medical officer bears only on the physical suitability, whereas the final evaluation is incumbent to the commanding officer in collaboration with the field surgeon. High altitude tolerance is not synonymous with altitude efficiency.

4. Natural adaptation to high altitudes.

LUFT (Berlin)

High altitudes - regardless if attained by mountain climbing or by airplane - confronts the human being with a hazardous change of the conditions of life. The most important factor in the effect of high altitude is the decrease of oxygen pressure in the air. In aviation, altitudes of more than 10 000 meters can be reached by the use of adequate oxygen equipment. If the aviator penetrates into altitudes in which the total pressure is less than 1/5 of the pressure on the ground, even the respiration of pure oxygen will not suffice for maintaining the human forces. Mountain climbers in the Andes and Himalayas have furnished the proof that an adaptation to the high altitude conditions is possible to an astonishing degree. An increase of altitude tolerance due to a stay in the high mountains means additional altitude, permitting to penetrate farther into the stratosphere by use of the ordinary oxygen equipment. Furthermore this gain of altitude affords a greater security in case of the interruption of the oxygen supply. Investigations carried on in research stations in the Alps dealt in the first place with the effects on the respiration. An increased aeration of the lungs was observed in a series of test persons, in some of them the minute volume went up by 35% above the value on the plains. In the course of 5 to 8 days a gain of 13 millimeters Hg, could be observed in the alveolar oxygen tension. The corresponding reduction of the carbon dioxide tension of the lungs clearly revealed a shifting of the blood reaction to the alkaline side, which latter caused a decrease of the bicarbonate contents so that the normal acid-alkali balance was almost reestablished. The increased respiratory functions are particularly obvious under acute oxygen deficiency and account for the fact that a mixture poor in oxygen similar to the conditions of an altitude of 8500 meters could be endured without notable difficulty for more than 20 minutes as compared with 5 minutes on the plains. The adaptation effect of the test persons was checked after their return to the plains and it was found that the increased altitude fitness as tested in the low pressure chamber and in a mixture poor in oxygen lasted for about 4 to 6 weeks.

5. Exchange of gases at high altitudes.

OPITZ (Berlin)

The transportation of oxygen from the blood into the tissues is exclusively effected by diffusion, that is to say it depends on the surface involved and on the difference of tension between the two phases. Most striking is the fact that the O_2 consumption remains constant under O_2 deficiency. Only in case of a most severe lack of oxygen does a drop of the O_2 intake below the so-called critical threshold due to an insufficient pressure of diffusion occur. This threshold is reached in human beings at an arterial oxygen tension of 25 to 28 millimeters or less. Rebreathing tests were made (in collaboration with F. PALME and R. HESSE) at the Brandenburg-House in the Tyrolean Alps (3,280 meters) with the view of determining if this critical threshold is shifted to the range of lower oxygen pressure by altitude adaptation. The characteristic changes of the critical alveolar oxygen pressure revealed in three test persons that this value was actually lowered by almost 4 millimeters by altitude adaptation. Analogous observations were made with the currents generated by the action of the brain, at the critical threshold we observed waves with a frequency of 2 to 3 Hertz instead of the normal 12 Hertz waves; the alveolar O_2 tension at which these critical changes occur is likewise lowered. The electrocardiographic examinations lead to an opposite result. If a relation is established between the flat deviation of the T-wave in lead II to the alveolar O_2 tension it can be observed that the flat deviation of T in a period of oxygen deficiency is more pronounced in altitude adapted persons than in the inhabitants of the plains. The decrease of the critical alveolar oxygen tension and the behavior of the brain action currents point to the fact that the conditions of oxygen diffusion in the central nervous system were changed by the altitude adaptation. It is, however, uncertain whether this improvement is due to changes in the circulation or by special properties of the cells.

6. Effect of cold.

BREITNER (Innsbruck)

A survey is given of modern literature on this subject. The experiences gained by the Swiss Captain of the Medical Corps (DEBRUNNER) point to the possibility of fargoing restitution even over the elapse of several days. Apart from cases in which quick amputation is necessary the surgical measures should as a rule be conservative. In the modern concept two problems stand in the foreground: The periarterial sympathectomy is likely to contribute considerable to a fargoing subsidence of the effects of cold and to a quick demarcation in case of necrosis. Early amputation, as advocated among others by von LOEWEN, though possibly implying too great a loss of the extremities, eliminates the hazard of remote effects of the injured tissue on adjacent sound areas and late aftermaths in the sense of SUDEK's bone atrophy.

7. Effects of cold.

LOOS (Innsbruck)

The speaker dealt principally with the local effects of cold from a dermatologic point of view. He spoke at some length on the internal and external factors causing effects of cold and proposed considering the quickly passing alterations due to short exposure to cold, the so-called "indifferent reactions to cold" apart from the actual injuries due to cold. It can be taken for granted that vaso-active histamine-like substances play an important part in the vascular disturbances which are a predominant factor in the effects of cold. The therapy was then briefly outlined. Its main objective is the restoration of normal circulation, and the substances referred to above are of importance in this connection too. Even in the prophylaxis against the effects of cold encouraging results have been obtained in the treatment of the skin with histamine-like preparations, which should give rise to systematic examinations in this respect.

Discussion of reports 6 and 7:

LUFT: The hazards of cold increase with the altitude. Examinations should be carried through to determine whether or not the favorable therapeutic influence of oxygen in higher altitudes will also be observed on the plains.

SCHWIEGK: A sudden warming up in case of a general effect of cold might prove hazardous, since the disproportion between the vascular volume and the circulating quantity of blood might cause a collapse.

ANTHONY: The fear of this collapse is not well founded as recent examinations could prove.

RANKE: Little connection between the consumption of alcohol and effects of cold has been observed. Smoking, however, creates a specific susceptibility of the respiratory passages to the effect of cold.

PARADE: Female sexual hormones proved very successful in case of disturbances of the circulation. Since the urine of both males and females contains femal sexual hormones, these may be considered the effective ingredient in the treatment of frozen feet with urine, practiced with good success by the inhabitants of the extreme north. A vascular dilatation may also be attained by CO_2 and excellent results of the treatment with carbon dioxide have been obtained.

LEHMANN: The production of adrenalin is very high if the body is exposed to extreme cold, and this easily explains the conditions of exhaustion.

8. Chemical regulation of heat in extreme cold.

KRAMER (Berlin)

The chemical regulation of heat as discovered by LAVOISIER is divided into two distinctly differentiated mechanisms: 1. voluntary and involuntary function of the muscles; 2. increased basal metabolism at rest. The quantitative aspect of the regulation can only be demonstrated to a limited extent. GESSLER found in a series of tests of short duration an increase of the basal metabolism at rest by as much as 25% with a slight drop of temperature below 18° Celsius. Fluctuations of the basal metabolism due to the season showed variations in the sensitivity of the heat center, which correspond to the curve of the daily average temperature. Tests carried through under extreme cold (stay in polar regions, high mountains) pointed in the same direction, namely increase of the basal metabolism with a decrease of external temperature. My own tests in a refrigeration chamber on normally dressed test persons at temperatures down to minus 20° Celsius reveal an increase of the metabolism up to 100%, and which, therefore, lies in the range of the thyreotoxic increase of metabolism. These increases of the metabolism are, however, due to both of the two mechanisms mentioned above, for as long as the involuntary function of the muscles (trembling) does not set in, the increase of the metabolism does not exceed 25%. The extent of the chemical heat regulation due to a genuine increase of the metabolism under extreme cold, which is by no means sufficient to maintain the necessary body temperature, is striking.

Discussion:

STRUGHOLD: The question as to sensitivity of definite areas of the body with regard to the thermo-regulation is raised by this speaker.

9. Clothing problems.

RANKE (Berlin)

The light and heavy winter protective clothing were demonstrated. Reference was made to the necessity of determining the insulating qualities of different clothes, which task is incumbent to the physiologists. A suitable instrument for these measurements has been developed and a picture of this instrument is presented. The results confirm the well established observation that the permeability will be the lower, the thicker the air cushion retained between two layers of clothing.

10. Practical problems of the protection against cold.

HILDMANN (St. Johann)

This consultant reported on his experiences as a medical officer gained in the winter campaign 1941/42 in a ski battalion in Russia. A maximum protection against cold is attained by a honey-comb-like system of air cushions in immediate proximity of the body as is secured for instance by a double layer of knit underwear. Protective overcoats are less effective since the air cushion formed by them is not in direct contact with the skin. The use of ointments is rarely observed by the troops in a general and satisfactory manner, so that reliable observations could not be made. The idea of the use of ointments is, that the vessels are prevented from their normal reaction to cold by virtue of an applied layer of grease. As far as prophylactic measures are concerned preference should be given to those measures which aim at a voluntary or involuntary adaptation of the capillaries to cold.

In the treatment of new local injuries due to cold, the vascular spasms which are more impressive than the momentary loss of temperature will be relieved best by the stimulative effect of alternating hot and cold baths. No reaction whatsoever of the vessels is observed in old localized injuries due to cold. This is explained a priori by the formation of vasodilating substances in the frozen tissue and it was emphasized that the therapy will have to counteract these phenomena.

A general chilling of the body limits first of all the wish to move and to be doing things, associated with a certain stiffness of the muscles. These symptoms were observed in all men of certain units. A slight and moderate degree of chilling may be tolerated for several days. After that time excessive thirst, loss of appetite, permanent headaches and weariness will set in. Injured soldiers are especially prone to injuries by cold in mobile warfare in winter time, since the loss of blood, immobilization and wound shock constitute additional hazards. As compared with summer conditions a higher fatality rate is observed even in case of slight injuries, generally four to six days after the injury. Death is due to a failure of the circulation which cannot be overcome by the administration of drugs. In the treatment of a general chilling preference is given to the method of a quick warming up of the body. In case of a prolonged stay in the cold without any possibility of rest and warming up, meals prepared with fat meat are not acceptable; the soldiers prefer light soups and hospital diet under these conditions. Frequent small meals consisting of cookies, biscuits and bread help to tolerate the cold.

Discussion:

STRUGHOLD: Points out the fact that the hair of certain kinds of animals contains air.

ANTHONY: Agents which will counteract both localized and general effects of cold will always remain a utopia.

11. Problems of the metabolism in the high mountains.

LANG (Berlin)

In spite of a great many examinations our knowledge regarding the metabolism of the basic foodstuffs in the high mountains is very limited. The tests have been of too short a duration to yield reliable results. The information received is often contradictory and this is not so very surprising if one considers that many factors such as the dilution of the air, cold, radiation and strain are involved.

As a critical evaluation of the results gained so far on the carbohydrate metabolism in the high mountains the following facts seem to be well established:

1. The carbohydrate tolerance of the human being is increased in the high-mountains;

2. The effect of adrenalin on the blood sugar is more pronounced in the mountains than on the plain;

3. The R.Q. (respiratory quotient) on the intake of sugar goes up more rapidly in the mountains than on the plain.

It must be assumed that the stored carbo-hydrates of the body have become more mobile in high altitudes and thus used up easier. The practically highly important question of whether or not the carbohydrate stock of the body is decreased in high altitudes remains unsettled. In short tests in very thin air a considerable decrease of the glycogen contents of the liver and muscles is regularly observed, which cannot be balanced even by the administration of insulin-glucose. It is, however, possible that the glycogen contents will decrease again on a prolonged stay in high altitudes as is maintained by SAPEGNO.

No information at all is available concerning variations in fat metabolism in high altitudes. Essential disturbances of the protein metabolism were not observed. LOEWY, who had an opportunity to examine the urine of 7 members of the DYRENFURTH-Himalaya expedition did not observe any remarkable changes of the N-components of the urine. In our own experiments, however, certain subtle changes of the amino acid metabolism (increased excretion of Imidazol corpuscles, decreased urine N-fraction precipitable by hydragyrum sulfate) until the body adapted itself to the altitude conditions could be proved. The higher the altitude the longer the adaptation period. Presumably these slight changes in

the metabolism are due to a temporary disturbance of the liver functions, which must also be considered as the cause of the porphrinuria occurring until the adaptation takes place and which has no connection to the hemoglobin metabolism. The reduced process of transformation of fructose into glucose further points to a disturbance of the liver functions. Disturbances of bile secretion were observed too. A certain strain is laid upon the protein metabolism by the new formation of hemoglobin. In a test carried through on myself, 150 grams of hemoglobin were formed in 20 days, that is to say 7.5 grams per day. In untrained persons the formation of muscle substance has to be considered in addition.

The question whether or not the total nitrogen metabolism is increased in the high mountains is of special interest. The former tests made in this respect are not entirely satisfactory. It is essential, however, to know whether the oxygen requirement of the organism is particularly high just at the time when little oxygen is offered to the body.

Discussion:

PARADE: The influence of training and ultraviolet radiation on the cholesterin level was mentioned by this speaker.

STRUGHOLD: This consultant pointed out the necessity of accurate determination of the basal metabolism at high altitudes.

12. Heat regulation in conditions of excessive heat.

RANKE (Berlin)

The heat regulations in excessive heat and cold show certain parallels and both are of special importance in the high mountains, where special attention is due to the influence of physical strain. According to the classic concept the basal metabolism assumes a minimum value at medium temperature, whereas it is observed to be on the increase at high or low temperatures. The problem, in how far the low outside temperature is compensated by the increased metabolism, and what amount of heat is drawn off by the ambient cold is discussed in KOENIG's paper about the "homoiothermal kernel" and the "poikilothermal shell" of the entire organism. According to his theory the withholding of the circulation due to cold is a measure of the organism to protect the kernel against cold. Vice versa the increased circulation of the skin due to heat facilitates the diffusion of the excessive amount of heat. The reflexes of the skin viewed from this angle do not suit the purpose under all conditions: namely in case of a quick warming over causing the circulation of the skin to increase abruptly.

Thus the blood of the shell will cool down and have a paradoxical cooling effect on the kernel which might initiate a hazardous collapse. The kernel supports only a limited fluctuation of temperature without serious damage; there exists thus a law of time for the heat regulation: an excessive heat or cold which may be supported for a short while will, if continued, cause a hazardous increase or fall of temperature of the kernel. If, however, the kernel remains homoiothermal, the ambient temperature will not exercise an influence on the metabolism, which fact has been verified by the tests of KRAMER. Only on the increase of the temperature of the kernel will the well-known disturbances and precursory signs of an imminent collapse appear to be associated with disturbances of the circulation which can be demonstrated by the EKG and which subside on recovery. On the strength of clinical tests it could be verified that high external temperatures may be tolerated for many hours if the temperature of the kernel does not rise by more than 0,2 degrees Celsius and if the pulse rate does not increase by more than 10 beats per minute. Objective criteria have been established for the so-called "comfortable feeling". The limits of the "comfortable feeling" conditions may be represented in a diagram according to MOLLIER in which the temperature and humidity of the air will be the coordinates.

Discussion:

LEHMANN: In the adaptation to heat the body produces a perspiration of low concentration. It is important that small amounts of liquid be taken in on frequent occasions if work is to be performed in heat so as to keep the osmotic pressure as stable as possible. The admixture of salt to the drinking water is only indicated if the normal adaptation will not be sufficient.

LUFT: It was observed that the Arabs in Africa put on their burnooses during the Ghibli (very hot wind) presumably to reduce the evaporation.

13. Physicochemical problems of respiration.

FISCHBECK (Berlin)

The different stages through which the oxygen has to go on its way from the alveoli to the tissue, including the redox process and the oxidizing ferments, has been so thoroughly investigated that we are in a good position to estimate the relative inertia of reaction of the different stages by comparing their speed of response. These investigations afford us a clear picture of the inertia of reaction which opposes itself to the flow of oxygen. The stage with the greatest resistance will have the most importanne in case of oxygen deficiency due to decreasing tension. It was furthermore demonstrated in which way the

position and readaption of the chemical equilibrium, the diffusion in the membranes and fluids, the speed of the blood circulation and other factors act jointly and influence the speed of oxygen intake.

14. The substances affecting blood formation.

WESTPHAL (Berlin)

The supply of the organism with oxygen is the main problem of physiology of high altitudes; in this connection the study of the blood formation viewed from the chemical aspect seems to be important. Experiments of WHIPPLE and collaborators on anemic dogs have verified that a diet very poor in protein will impede the synthesis of the red blood pigment; additional intake of protein leads to a new formation of hemoglobin (about 1 gram per 7 to 8 grams of food protein). The intake of amino acids likewise increased the hemoglobin values by 25 to 30%. Examinations on anemic dogs with radioactive iron revealed that this element which is responsible for the oxygen carrying function of hemoglobin was rapidly resorbed and used for the formation of new erythrocytes.

Little is known about the initiating mechanism as viewed from the chemical aspect. Whereas the effective substances in a pathologically changed blood forming system (anemias) were given much attention from a chemical point of view only a few findings seem to point to an implication of specific ingredients in the normal physiologic formation of blood. Specific substances (hemopoietin) were observed in the serum of rabbits after venesections which caused an increase in the number of erythrocytes in other normal rabbits (CARNOT and DEFLANDRE 1906); the presence of these substances was also proven in the marrow extracts of animals which were made anemic. Later on the hemopoietins were also found in guinea pigs and rabbits which had gone through breathing tests under oxygen deficiency (low pressure chamber) (MUELLER 1912, FOERSTER 1924). The hemopoietins also occur in human beings in case of an oxygen deficiency; SCHWARTZER and LOESCHKE 1940 were successful in proving them in the blood of the umbilical cord of a one week old baby. Recent tests on human beings revealed that a short stimulus caused by oxygen deficiency will be sufficient to increase the number of erythrocytes in the sense of an altitude adaptation; the test persons in question were breathing repeatedly for several minutes with interruptions of several days a gas mixture poor in oxygen (BRUEHL and HANISCH 1942).

The exact location of the hemopoietin formation is not known. The spleen, if it plays a part therein, will certainly not be the only organ, since the hemopoietic substance was also found in spleenectomized rabbits. The blocking of the RES (reticulo-endothelial-system), however, prevented the formation of hemopoietin as well as the increase of erythrocytes and hemoglobin under high altitude conditions

(LOEWY 1934). The removal of the thyroid gland and thymus jeopardized the accelerated blood regeneration following the administration of hemopoietin; if in addition to these two organs the spleen was extirpated the response to the administration of hemopoietin was reestablished. Histologic examination revealed that these effects act in the bone marrow (ASHER and NAKAO 1925). The latest research work confirmed an increased function of the erythropoietic tissue of bone marrow due to extracts of thymus (de CANDIA 1942).

The examinations of hemopoietins made so far had only an informative character. The question whether or not the normal physiologic new formation of blood is regulated by specific substances or if non-specific decomposition products of blood play a part therein still remains to be clarified by more systematic examinations.

Discussion:

PARADE: Do specific hemopoietins really exist or is the hemopoietic effect started by vegetative or hormonic regulations?

LEHMANN: Inquired after the real origin of the hemopoietins.

BALKE: Reports on his experiments with hemopoietins at the Mountain Medical School.

15. The measurement of physical efficiency.

LEHMANN (Dortmund)

An exact measurement of that kind is only possible with regard to a definite form of work. The results then obtained will, beside the individual differences, be rather heterogenous according to which organ under most strain is used for this purpose. If the efficiency is measured up to the limit of exhaustion, the determination of the latter will be very subjective. Therefore, a series of objective measuring methods has been developed based on the amount of work performed with a regular intermission for recovery ventilation until a predetermined pulse rate or minute volume is attained. The values are then given in terms of the product of pulse rate and blood pressure amplitude. With the above mentioned method in which the amount of work is adapted individually to the strength of the muscles, so that the time elapsing until the limit value is reached indicates directly the respective degree of efficiency, it was possible to demonstrate the influence of drugs and nutrition on efficiency. The fluctuations of efficiency due to the influence of physiologic factors in the course of the day are called efficiency conditions. The conditions are characterized by the adrenalin load of the bloodplasma as determined by LEHMANN and MICHAELIS.

Discussion:

TROJA: The limit value of an amplitude frequency product of 10 000 as used by LEHMANN will not always suffice for well trained mountaineers who in many instances reach that value in the first minute.

16. The efficiency of the mountain soldier.

CREMER (St. Johann)

Since the problem of fatigue - objective definition of the term and causes - has not yet been solved in a satisfactory manner so far. It seems to be indicated to deal first with the reverse: efficiency. The maintenance and the increase of efficiency in the mountains appear as the most important tasks of the mountain physiologists. First of all the definition of "efficiency" is explained, and the organ and organic systemson which the efficiency depends were reviewed. The enumeration of all the internal and external factors of influence on efficiency lead to the question as to how the efficiency could be increased artificially. After a discussion on the efficiency stimulating drugs the nutritive problems in the mountains were brought up. A special mountain diet - low weight, high nutritive value, quick preparation - has been developed. This diet will for the time being only be issued in case of special missions of mountain troops but after the war it might be available for all mountaineers as an ideal diet.

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